BBC·MASTER·ELECTRON·ARCHIMEDES £1·30

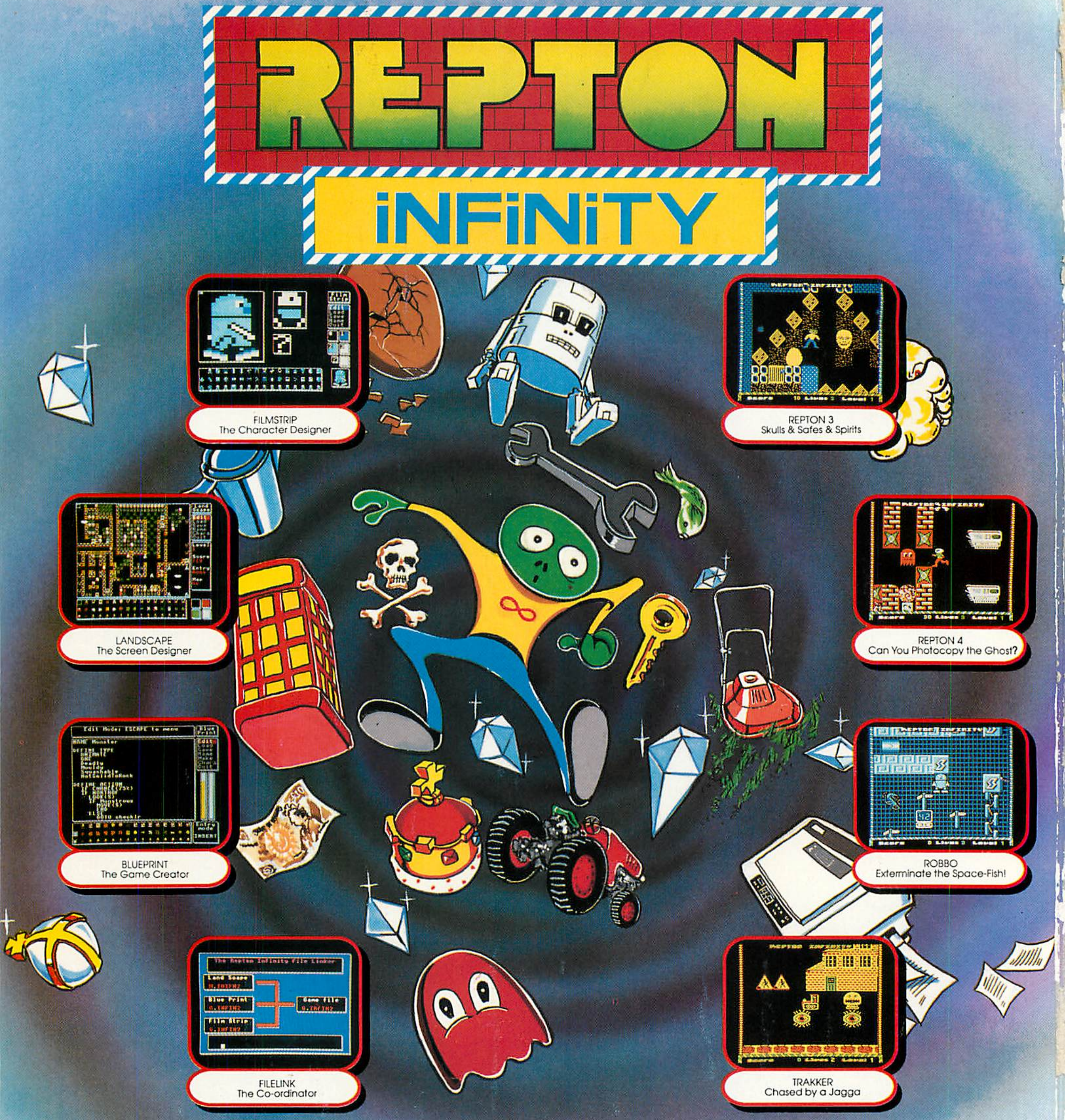
# ACORN USER

DECEMBER 1988 BIGGEST AND BEST-SELLING BBC/ACORN MAGAZINE




## ESSENTIALS FOR YOUR BBC MICRO

£1000 COMPETITION: 6 HYBRID MUSIC SYSTEMS TO BE WON




## REPTON INFINITY — Featuring a Sophisticated Game Creator

The Repton series of games is the most successful set of software ever published for the BBC Micro and Electron computers; more than 120,000 Repton cassettes and discs have now been sold. Repton has been aptly described as "the thinking man's arcade game" . . . since it requires the use of clever strategy as well as pure arcade-skill.

Repton Infinity is the ultimate Repton program. You can completely redesign all of the game characters and game screens. But more than this, you can now also create a wide range of diversely different games by using a special game-creating language.

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- Robbo – a crazy robot in a strange topsy-turvy world,
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- the Repton 4 game – with 8 game screens,
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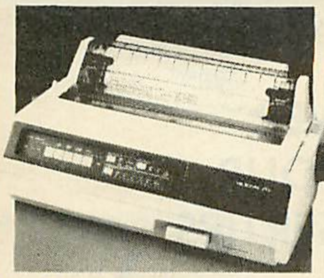
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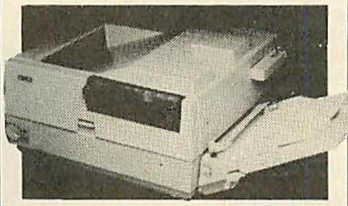
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**We've maintained 100% file and keystroke compatibility with Z88 PipeDream, so you can transfer files between the Z88 and your Archimedes.**

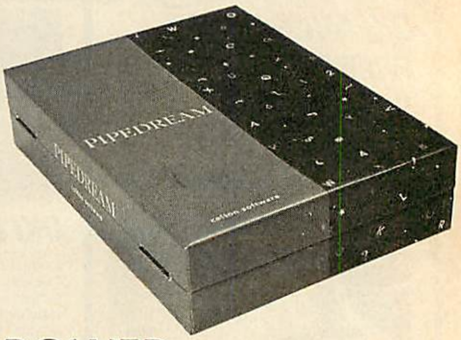
PipeDream is also 100% file compatible with PipeDream on the IBM PC, and Acornsoft's VIEW PROFESSIONAL for the BBC Microcomputer, so you could work at home on your BBC Microcomputer and take your files to the office on your Z88, to use on your Archimedes or IBM PC. No other software enables you to share your files with all these computers.

New facilities include:

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- a comprehensive range of financial functions
- full usage of foreign characters including direct editing and printing
- loading and saving in several formats giving compatibility with Lotus 1-2-3
- linking files enabling you to pass the results of calculations between spreadsheets.

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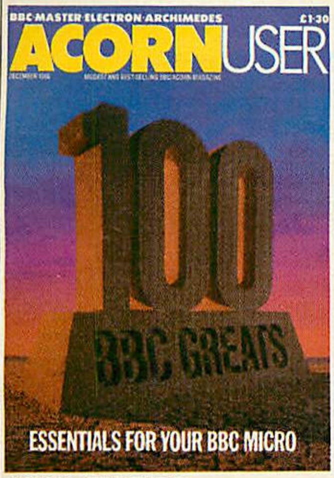
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# ACORNUSER

ISSUE No 77 DECEMBER 1988

## COVER






## EDITORIAL

Acorn is about to enter a new phase of its development. The much heralded UNIX-based workstation will be arriving soon, taking Acorn upmarket into the corporate and technical world.

But this market is very attractive to the big companies too; IBM, Apple, DEC and Hewlett Packard are all getting involved. And it is already crowded with some of the world's most successful small computer companies. Strong standards ensure the competition in this market is truly international. How will Acorn survive?

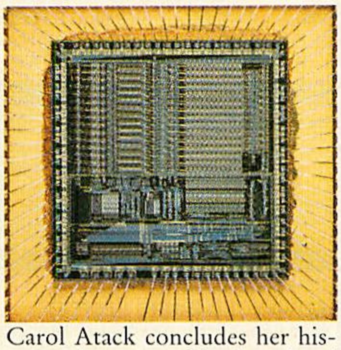
Of course the ARM chip will help, and a workstation is the sort of machine ARM was intended for. Assuming that Acorn can use it to do something spectacular on price, then it could open the workstation market right up. But Acorn will need all the mainstream credibility it can muster to be taken seriously in the corporate world.

## NEWS



## FEATURES







## REVIEWS







## EDUCATION

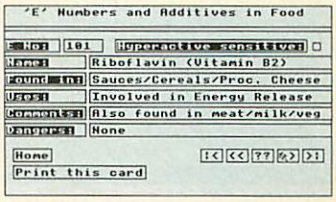


## REGULARS



## NEXT MONTH

Joe Telford introduces *User Card*, a simple-to-use database for the BBC micro. Plus how to take photographs of your computer's screen, more on GKS graphics, a look at new printers and all the regulars.




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"Its very easy to create an entire customised front end for your own use." - *Acorn User, August 1987.*

"ACP is much better than any of the other front end systems I've seen." - *Acorn User, August 1987*

"I can recommended it to anyone who wants easy access to the Electron's functions." - *Electron User, August 1987.*

**ACPs main features are:-**

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"It's a superb add-on and a must for all serious Electron Users"...
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("ADI features an extremely comprehensive sector editor, and one of the finest I've seen". . .Tubelink on Prestel)

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### ADVANCED 1770 DFS

**3 versions ADM/C(11) - ADB(12) ADE (13)** £34.50

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(16K EPROM + comprehensive manual)

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**"A marvellous piece of design. . .don't hesitate buy it!" - *EU, May '88***

**£33.00 excl VAT; £37.95 inc VAT**

**UPGRADE SERVICE** for the original Acorn Plus 1 to Advanced Plus 1 and AP6. This will provide all the benefits of AP6 and also includes the printer circuit modification fo some modern printers. (AP6 can be fitted to original Plus 1 by users with soldering experience) for upgrade service add £7.000 + VAT to AP6 price ie

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A unique interface for those wanting the maximum expansion from just one slot in the PLUS 1 AP5 contains:- A User port for connecting peripherals such as a mouse. 1 MHz bus allowing Music 5000(e), prommers and various control devices to be added. Tube interface for connecting and Acorn 2nd processor or even a Master Turbo board (through a 'Co-Pto Adaptor') - & TWO spare ROM sockets (1 high priority). All hardware connections are Acorn compatible thereby allowing many BBC products to be added (remember that some software modification may be necessary for the Electron). So although some expansion options may appear expensive on an Electron you do have upward compatibility.

**£55.00 Ex VAT; £66.70 inc VAT**

**Advanced Plus 2 ROM**

We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:

1) Fix for Tape filling system in Hi-res screen modes. 2) * ROMS- displays ROM/ROM images present. 3) * UNPLUG disable ROM/RAM image. 4) * INSERT - enables or inserts a previously unplugged ROM. 5) * KILL - totally disables the Plus 1. 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found. 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found. 10) * SAVEROM - saves a ROM image to current filing system. 11) * LOADROM - loads a ROM image from current FS into a RAM bank. 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3. 13) * VERIFY - tests every sector on an ADFS disc. 14) * VFORM - formats and verifies an ADFS disc in one command. 15) * BUILD - creates a text file that can be used by *EXEC (ie !BOOT). 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers. 18) * DUMP - to view a file's contents on screen. 19) * LANG - selects a default language to be booted on {CTRL-BREAK} 20) * HELP - provides a full 'help' list on all the ROM's commands. 21) * AQRPAGE - selects specified page in AQR.

Now there is no need to search for your utilities disc every time you want to Format/Verify a disc, Build a !BOOT file or lock/unlock/Load a ROM image into ABR PLUS much more . . . . . the ideal companion from the company that produces the Acorn Plus 1.

**£11.00 ex VAT; £12.65 inc VAT**

The AP2 is the definitive Plus1 ROM. . . . .I'm not sure what i'd do without it. . . . .like all of PRES's other products, it's been well worth waiting for" July '88

## FILING SYSTEMS

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# NEWS

## Useful files

Econet managers and users can take advantage of a new set of utilities to control networked classrooms. Healthdata's Networker disc will work with any SJ Research Acorn Fileserver or Filestore. It allows you to chat with any station, look through all stations in turn to catch idle pupils, send messages, and copy directories. The file-server clock can be reset from a teletext adapter. The programs come on a 5.25in 80-track disc and cost £24.95.

## Cop this lot

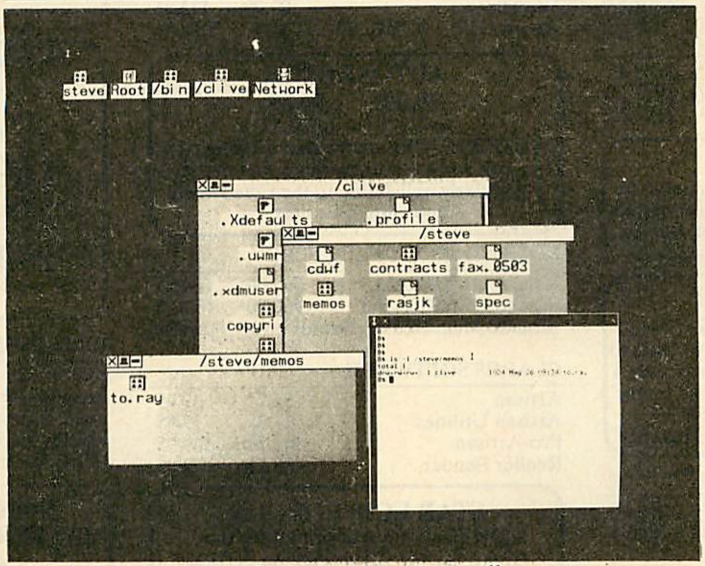
Computers are joining the fight against crime with the launch of *Cop Shop* disc from the West Mercia Constabulary. It includes five games to improve children's understanding of personal safety. *Stranger Danger* Home Watch asks users what they would do if they saw someone breaking into a neighbour's house. The Constabulary advises that the program should be used in conjunction with a visit from a local police officer; to obtain a copy send a blank formatted 80-track 5.25in disc or 3.5in disc to Inspector David Wornham, West Mercia Constabulary.

## Minimum cost

A new cheap add-on will make it easier for users of BBC micros to make music. The MHO from U music, makers of UMI, costs only £60 but is based on the same software used by pop groups like Erasure and Bros. It is a MIDI controller which allows the computer to control keyboards and drum machines which conform to this international standard in electronic music. MHO – it stands for Minimum Hardware Option – will work with BBC and Master computers.

# Acorn works on Unix for Europe

Acorn is to be one of the partners in Multiworks, an EEC project aiming to develop a Unix workstation. The EEC wants a low-cost machine to challenge the American dominance of the Unix market. The project is part of its Esprit programme which funds research in the computer industry. Work will be led by Olivetti. Several other manufacturers are involved, including West Germany's AEG, France's Bull, the Netherlands' Philips and SGS-Thomson from Italy. Other British contributors include ICL and Cambridge software house Harlequin.




**This is how Acorn's Unix workstation will appear to users. Acorn has licensed *X.Desktop*, a Unix user's interface produced by IXI in Cambridge, to provide an intuitive WIMP environment for users unfamiliar with the arcane and complex commands required by the Unix operating system.**

Harlequin's Jo Marks said, 'The formal contracts haven't yet been signed but we expect work to go ahead in January. The project will take about four years to complete.'

Acorn's role is to develop its RISC processor for use in the machine. John Head-Rapson, who co-ordinates Esprit in the UK, says, 'The specification is still being drawn up'.

Previous attempts to develop a pan-European workstation have foundered on this issue, especially the choice of a microprocessor. Now that Acorn has developed the ARM chip, the choice is simplified.

'It's never been a secret that the ARM chip would be further developed,' said Michael Page, corporate communications manager at Acorn.

# Smalltalk is cheap on Arc

The fifth generation of computing is coming to the Archimedes with the release of Smalltalk 80. Other computers like the Macintosh owe much of their on-screen appearance to this programming language's library of bit-mapped graphics. It is also used for artificial intelligence applications and for object oriented programming.

This is the first time that the program has been available so cheaply or on such a cheap machine as the Archimedes 440. The program will cost around £540, and less than half that to educational users.

Previous versions of the software cost around £2500 and could only be run on expensive dedicated workstations costing over £25,000. But the Archimedes version runs just as quickly. 'The Acorn RISC chip is powerful enough to run Smalltalk 80, and for artificial intelligence,' said developer Smalltalk Express's John Ash.

The program was shown simultaneously by Acorn at a military equipment show and by OOPSLA, the Object Oriented Programming Society of Los Angeles, at a meeting in San Diego. Arc computers were flown over specially for the launch, attracting plenty of interest from the Americans.

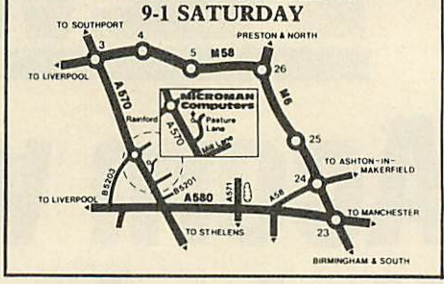
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# Lingenuity gets into control

Two new products from software house Lindis will make their debut at the *Micro User* show. The Lingenuity *Control Panel* allows users to reconfigure the Archimedes CMOS RAM without having to know the complicated *configure commands often needed.

For example, if you are using a modem and need to change the baud rate setting you can simply point to the modem icon and click on the mouse until the right speed is reached. Other configuration files can be loaded in from the company's start-up program. The *Control Panel* will cost £14.95.

An add-on for the Watford Digitiser will enable users to digitise pictures in colour as well as mono. It will cost £149 and is only available direct from Lindis.

# Words find room

If your Z88 means that there isn't room in your briefcase for a dictionary, Computer Concepts has come to the rescue with a spelling checker on a ROM chip. *Spell-Master* fits into one of the computer's expansion slots and costs £59.

Problems have been reported with early versions but these have now been fixed and registered users should send their EPROMs back to Computer Concepts to be replaced.

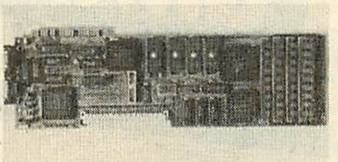
# Family affair

Tracing family history is a complex business which requires time, patience and a computer. On paper all the details quickly get out of hand. But *Heritage* (£29.95), a new program from Bel Tech, offers all facilities needed by genealogist BBC/Master owners.

# Waiting on Impulse

Computer Concepts showed its office system of the future at the PC Show. However, the two IBM-PC cards which make up the system can no longer be known as the *Equinox* system for trademark reasons, and a new name has yet to be chosen by the company.

'It's harder to think up a new name than it is to design a product,' said Computer Concepts' Charles Moir. The cards themselves are almost finished, with only the final touches needed to their operating system, *Impulse*. They contain a complete set of Acorn RISC chips which take over processing from the host PC and control the system's various functions. These include word-processing and desktop publishing, photocopying, faxing, document scanning and printing. The system and the fonts used will be compatible with *PostScript*, the graphics language that is used by many laser printers.



**Computer Concepts: Riscard**

The system, complete with new name, should be available early next year. However another new product, a fax card for the Archimedes, will be available in November and on sale at the *Micro User* show. The card is in the final stages of gaining BABT approval, a long procedure which Moir describes as 'ridiculous'.

■ A change of company policy sees the *InterWord* range of software available on disc for the first time.

Computer Concepts released Archimedes versions of *InterWord, InterSheet,* and *InterChart* as ROM chips some time ago, but buyers were reluctant to buy and install the expensive ROM/RAM expansion card needed to run them. Disc versions will be cheaper than the chips, although final prices have yet to be decided.

# Boy beats science with Archimedes



**Oliver and his Arc**

A west London schoolboy took just three hours to solve a mathematical puzzle which had foxed American scientists and which took one mathematician three weeks to solve using AT & T Bell laboratories' Cray super-computer.

Sixteen-year-old Oliver Riordan saw the problem when it was reprinted in the *Sunday Times*, and set his Archimedes to work on testing solutions. The poser was originally set by mathematics professor John Conway, best known for inventing the *Game of Life*. He offered $10,000 to the first person to solve the problem, not expecting to have to pay up.

It asked for the point in the number sequence 1, 1, 2, 2, 3, 4, 4, 4, 5, 6, 7, 7, beyond which all numbers when divided by their place in the sequence had a value within .05 of .5.

It took Oliver only a few minutes to get the answer on his Arc and he spent the rest of the three hours proving it.

Although the *Sunday Times* had offered a champagne prize to anyone in England who solved the puzzle, Oliver was given a programmable calculator. He'd been one of the earliest buyers of an Archimedes, so Acorn chipped in and gave him some software as an additional prize.

# Z88-Nationwide

Acorn's main distributor Kelator is to take on Cambridge Computer's Z88. This means that the portable will be available from a wider range of computer dealers. And Kelator is hoping that some of the education authorities currently testing it will buy Z88s for use in schools. According to Cambridge Computer's market research almost 90 per cent of teachers thought that there was a use in their schools for portable computers.

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Popular text adventures from Topologika are now available on 3.5-inch discs. Now Master Compact owners can enjoy adventures like *Kingdom of Hamil, Acheton* and *Countdown to Doom.*

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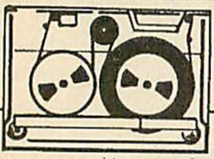
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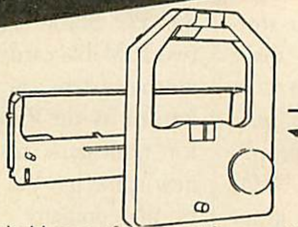
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| 6003 | LQ800 | Nylon | £3.45 |
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| 6005 | MX80/LQ800 | Multistrike | £2.10 |
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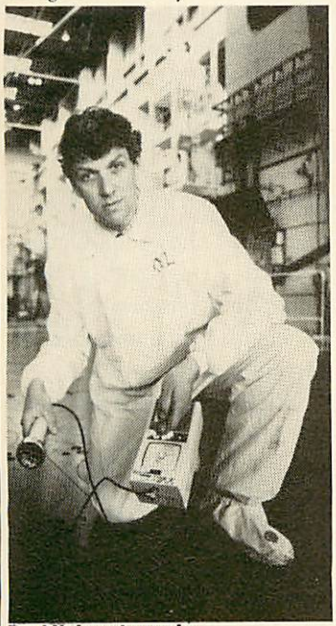
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# Science show

BBC radio and the City and Guilds of London Institute are taking a look *Inside Science* together. A continuing education radio series is running alongside a City and Guilds course, and is broadcast on Radio 4 FM on Saturdays at five o'clock.



Paul Heiney tunes in

Presenter Paul Heiney will look at aspects of science in the news from a non-technical point of view. Programme topics include nuclear power, water pollution, healthy eating and artificial intelligence. Teachers' notes, a book and software package for the BBC micro are also available. The software costs £21.35 from BBC Enterprises and looks in detail at four topics.

A multimedia pack including books and audio tapes as well as the software is £34.25. The City and Guilds Institute is also producing a disc for the BBC micro containing a multiple-choice test about the programmes. It marks tests and prints out results with suggestions for improvements.

# School plays on

The hymns are more modern than ancient at Bishop Barrington Comprehensive School in Bishop Auckland, County Durham. The school has two sites but only one piano. Only half the school could sing hymns each day, until the computer came to the rescue.

Kathleen Hammerton, head of music at the school, solved the problem by borrowing a Hybrid Music 5000 system from the local education authority. She recorded a selection of hymn tunes on disc using the synthesiser. These can now be played back by anyone. 'All they have to do is switch on the computer and press one button,' she explained. Unlike the piano the computer is portable and doesn't need tuning.

Headteacher Ken Davison said 'It is a very practical application of modern technology. The teachers hope to buy a music system next year with TVEI funds.

# Minerva down under

**Computer users down under were able to see the latest BBC and Archimedes software when Minerva Software toured New Zealand and Australia in November. Minerva staff visited user groups, education departments and dealers.**

**Minerva's Nova Fisher said 'There is a lot of interest in the computers, with education departments adopting the machines. And there is plenty of enthusiasm from dealers.' Minerva has added five new programs to its Archimedes range, including *Atelier*, an art package and *Ancestry*, a genealogy program.**

## THE COMMS COLUMN

The two educational on-line services, The Times Network for Schools (TTNS) and Prestel Education, between them serving over 8000 educational institutions have reached agreement in principle on a merger. The new service will be marketed by TTNS and Dialcom (UK), the Telecom Gold carrier.

Dialcom boss Graham Jones said 'This initiative underlines British Telecom's commitment and support for education and builds on BT's recent offer, in conjunction with DTI, to fund the installation of telephone lines in schools.

'The combined service will be both an aid for the curriculum and a valuable tool for educational administration.'

Gordon Jones, chief executive of TTNS, said: 'The rapid rate of change within the education world, brought about by the Education Reform Act and other influences, requires collaboration between service providers to meet the wide range of emerging requirements.'

Further information is available from Dialcom (UK) on 01-822 1056 and 80:BTG360, or TTNS on 01-782 7171 and 01:TCD034.

■ Tandata has announced a Vasscom version of its top-of-the-range £499 TM722 modem. Vasscom is the error-correction system used by Prestel, and makes this modem invaluable for high-speed Prestel access.

All Vasscom Prestel ports allow multi-speed access, which is useful as the TM722 doesn't support the standard 1200/75 speed anyway.

■ Amstrad has finally launched the SM2400, the stand-alone (ie any computer) version of its PC card modem. This operates at V21/V22/V22bis/V23 for £249, and is Hayes-compatible and BABT approved. Unlike the PC card version, this modem will correctly scan all four speeds on incoming calls, making it well worth checking out for all you sysops out there.

■ Microlink is promising one-way facsimile in the near future. A Microlink text email message will be able to be sent to a fax machine anywhere in the world. The facility to perform a multiple send will also be available. (BT doesn't seem to have got round to banning fax junk mail yet!) This service is actually very useful, as it cuts out the big problem with email, that very few people outside the computer industry are on it.

Of course, the reception of faxes and the handling of graphics is another matter, but this is still an important development for electronic mail.

■ The featured bulletin board this month is CCL4 run by James Lawson in Hull. The board contains a lot of material of interest to BBC users, including Music 500 downloads, digitised pictures and pokes for popular games, as well as special information for *Replay* users.

There is *The Grid*, an on-line adventure game in which you can save your position until next time, and a general music section.

The board is well worth a call on (0482) 655798, V21 or V23, 24 hours, Viewdata or Scrolling 8-N-1. The system determines which terminal system you are using by asking you to press Return, and if it gets a hash, it enters Viewdata mode, with a nice dynamic graphical screen.

■ If you have any comms news for David Atherton, please send it to him here at Acorn User, 20-26 Brunswick Place, London N1 6DJ, or by electronic mail on Prestel 942876210 and Telecom Gold 72:MAG11596.

**Dave Atherton**

# Archimedes stars on screen

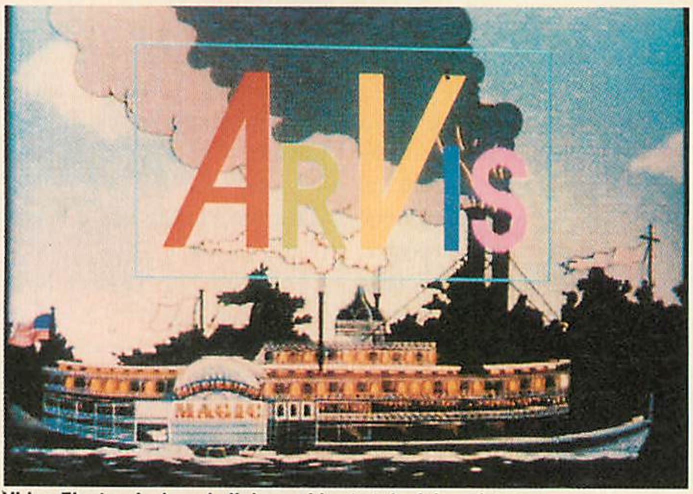
The Archimedes' speed and graphics capabilities are helping it to break into the glamorous world of video. Several companies are developing hardware add-ons which transform the computer into a video workstation able to manipulate images and add captions to them.

Before the Archimedes came along video editors needed to buy specialist equipment from companies like Quantel, whose workstations cost tens of thousands of pounds.

But it's not just the Archimedes which is finding its way into the studios – other Acorn machines like the Compact are a familiar sight in some television companies.

Video Electronics Ltd in Wigan is producing a series of boards covering a variety of video functions.

The first is a PAL encoder at £120, which converts the Archimedes' RGB (red, green and blue) video output into the composite PAL signal standard in British TV.




Video Electronics' cards link graphics to television pictures

The second is a video controller board costing £250, which genlocks images produced by the Archimedes to input from other sources, allowing computer graphics to be added to a length of film.

The final Videographics expansion card allows up to three video images to be superimposed and costs £800.

Another company, the Soft Option, specialises in interactive video, and has previously worked with BBC Domesday and IVIS machines. It is producing Archimedia, an interactive video workstation based on the Archimedes, and the first part, a genlock card produced in association with Wild Vision, is now available for £450.

'When we first saw the Archimedes we knew it was a natural interactive video machine,' said Soft Option's Richard Haywood. 'We've found that the new operating system is very impressive and very promising.'

One company has been using the Master Compact for some time. Autocue in Wimbledon produces a complete script preparation and teleprompting system based on two modified Compacts, the Autocue 1500 and Scriptnet station.

# Going great guns

A shoot-'em-up with a difference is teaching soldiers around the world to control heavy artillery. Westland System Assessment originally developed its *Indirect Fire Trainer* program (*WIFT*) to help a Bristol branch of the Territorial Army. Now the latest version of the program, which runs on the Archimedes, is being used by the Irish Army and by British soldiers in Berlin.

Enquiries are pouring in from armies in the Far East and both Americas.

Soldiers using artillery have to resposition their guns all the time to reach their targets. accurately. When this is controlled by spotters watching whether shells hit their targets it is known as indirect fire, as opposed to the direct fire of aiming a rifle and then pulling the trigger.

It is a skill which can be taught well through the use of computer simulations.

Westland's John Davies explains, 'We started off two years ago using the BBC Master, because we were looking for a cheap machine, and it had sufficiently powerful performance against cost.

'When the Compact came out we switched to that computer but it was still slow. We developed a direct fire simulator on the Archimedes because the program needed higher quality graphics and we decided to move *WIFT* on to the Archimedes as well.'

Systems have already been installed at Ireland's Infantry Weapons School.

The training program is being marketed worldwide by computer company Ferranti International.

# Shining example

If you're fed up with wintry weather you can now use your Archimedes to scan the skies in search of sunshine. An expansion card from Spacetech links the computer to weather satellites and allows it to create the sort of pictures which appear on TV weather forecasts.

The software includes picture processing utilities but not meteorological information; you have to interpret the data yourself if you want a forecast.

Pictures can be created and animated in 256 colours. Spacetech's Lucy Hornby says 'You can have moving pictures of clouds forming and bursting, going as fast or slow as you want.' A false colour option improves clarity. Pictures can be received from the Meteosat, NOAA 9/10 and Cosmos series satellites, depending on receivers installed; Spacetech can supply these as well as the podule which costs £259.95.

## Superior bites back

BBC games software supremo Superior has bought the Sheffield-based Alligata software label and the rights to many games released on it. Superior had already begun to release games for a wider range of computers but found its name lacked clout in the more competitive wider market.

The first joint release with Acorn/BBC micro versions on Superior/Acornsoft and others on Superior/Alligata is the boxing simulation *By Fair Means or Foul*, with cassettes £9.95, 5.25in discs £11.95 and 3.5in discs £14.95.

# Archimedes

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| 310M | 1027.00 | 85.62 |
| 310M Mono | 1096.00 | 91.37 |
| 310M Colour | 1280.00 | 106.74 |
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## Featuring Risc OS

The exciting new multi-tasking operating system for Archimedes, RISC OS, will be available early in 1989. Purchase an Archimedes under this scheme and you will be one of the first in the country to receive RISC OS, as soon as it becomes available. Your copy will be sent to you to install, or if you prefer, we will install it for you free of charge.

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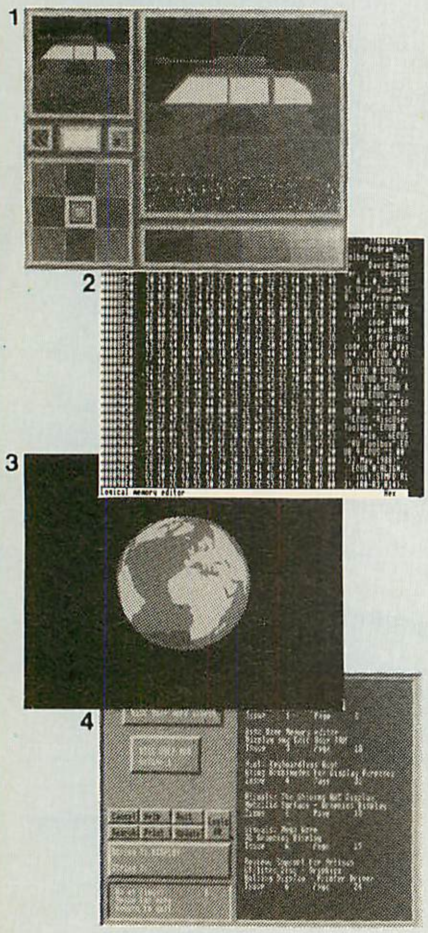
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**Altogether the items on this disc would be worth over £50 if bought separately.**

### This is what you've missed in volume1

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AD

## News in brief

■ Kenneth Baker recently announced a new working group to advise on the use of information technology in initial teacher training courses. School inspectors have criticised current efforts, saying that newly qualified teachers are ill-prepared with information technology skills and will be unable to implement the National Curriculum.

The group's report will be completed by March next year.

■ Acorn's new catalogue, *Hardware Expansions and Software Applications for the Archimedes*, comes just in time to catch DTI Software Scheme money for this year. Only packages running in native Arc mode are included. Most educational programs are rewritten or ported from the BBC B and Master series.

There are plenty of productivity and business tools, which may also interest teachers. The catalogue can be obtained from Acorn or your local dealer.

■ Wight Scientific has released a new version of *Signwriter* for the Archimedes. It is essentially the same as the IBM PC version, but slightly cheaper at £49.95. It features a full-screen editor, not available in the BBC version.

Fonts from BBC discs can be transferred to the Arc. The package now includes dumps for a wide range of printers including laser and 24-pin dot matrix machines.

■ AKOM Ltd, under licence from Times Newspapers has released a series of eight crossword discs running on a variety of computers including the Archimedes and BBC range. Each disc contains 60 crosswords from *The Times* or the *Sun* newspapers.

The software is available on cassette, £11.95, or disc, £16.95. AKOM Ltd, 51 Manor Lane, London SE13 5QW; tel: 01-852 4575.

# Developers shy of 32-bit software cost

*By Nick Evans*

Members of the Educational Software Publishers Association are proposing that new software development should focus on IBM standard machines and not the Archimedes or Nimbus at their November meeting. Could this initiative spell the end of Acorn's claimed domination of the schools market?

ESPA member LTS said that software was being produced for incompatible machines for political rather than educational reasons. Software publishers are hesitant about venturing into the diverse market of 16/32-bit development (see *AU* Education News, November 1988). It is simply too expensive, particularly with reduced software subsidies from the DTI.



**Developers challenge**

A cheaper approach is to develop only for the IBM, producing software which runs under emulation on Arc and Nimbus without needing conversion. The publishers can also explore export markets in the United States and Europe, previously closed because of their IBM standard.

If this IBM policy is implemented schools could see little new software for the BBC B and Master series, particularly for secondary users. However, members of the ESPA could decide that development for IBM machines is just as problematic and expensive as for any other machine.

While the ESPA meets, the National Council for Educational Technology (NCET) survey of software and hardware emulation will be revealed to the DES. This will be the basis for decisions on future hardware support grants.

# Prestel and TTNS merge for schools

The two main educational online systems, TTNS and Prestel, have joined forces 'to provide the education community with a much wider choice of facilities and options'.




**All this and TTNS too**

Neither of these organisations will disappear; TTNS will promote the joint service on behalf of British Telecom's division Dialcom (UK).

Graham Jones, the general manager of Dialcom, said that the collaboration was designed to build on the joint British Telecom/DTI offer for installation of data telephone lines within schools.

It would, he said, allow schools to communicate more effectively not only with each other but also with the wider outside community.

The announcement comes at the same time as a notification of price increases for TTNS subscriptions which rise to £269 initial subscription and £245 renewal for secondary schools and a standard £79 for primary schools under 100 pupils and £99 for those with over 100.

# Lego Logo

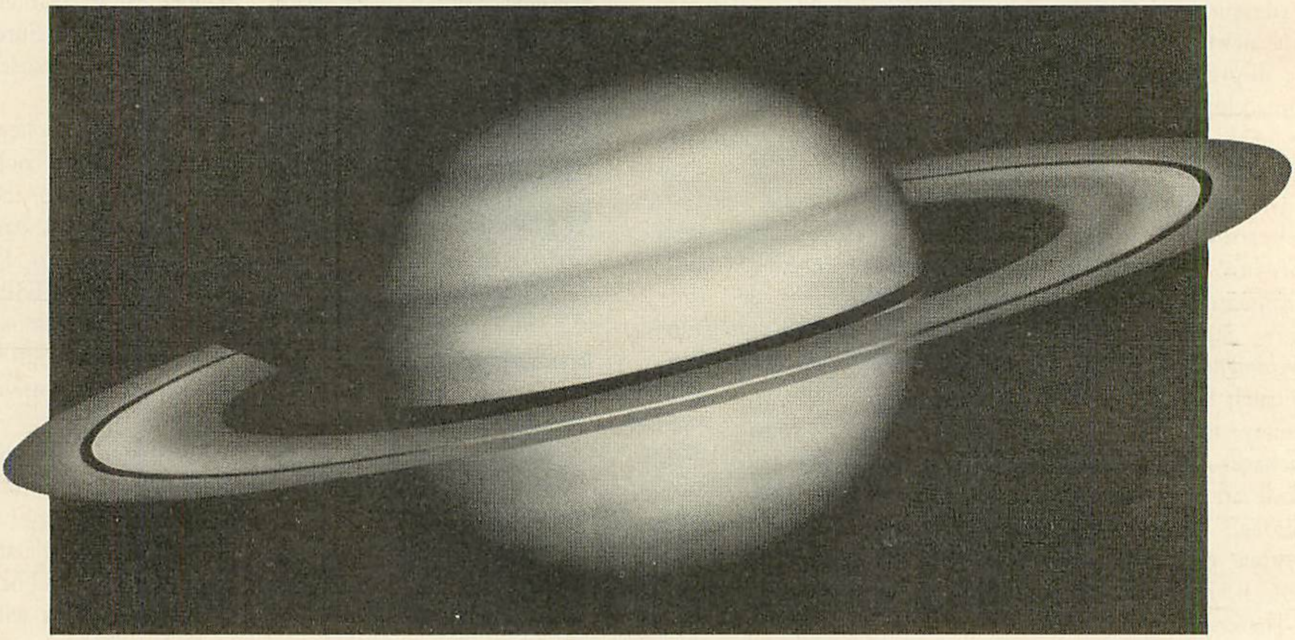
A joint Lego and Micro-Electronics Support Unit (MESU) development aims to ease the introduction of control technology into schools. *Dacta*, a resource pack, builds upon the already widespread use of Logotron *Logo*.

It should help to solve the problem of the primary school curriculum – where to place technology in an already full timetable – by fitting in with existing design and project work. Even those teachers with no knowledge of Lego, *Logo* or control technology will find they are able to use the equipment with their classes.

All parts of the pack may be bought individually but the entire resource pack costs around £89 from Lego. Lego UK Ltd, Ruthin Road, Wrexham, Clwyd LL13 7TQ; tel: (0978) 290900.

# STAR TREK OR

# (What other micro ha



Dr C J Baddiley has written many astronomical simulation and graphical analysis programs on his BBC microcomputer, including an accurate relativistic space flight simulator for journeys between real stars and galaxies, with high resolution graphics and clock and distance displays. It shows dramatic effects never seen in films. "The increase in speed of this program running on an Archimedes system is truly staggering," Dr Baddiley explained. "A two million light year journey from Andromeda galaxy to our Sun of twenty-nine years duration shows as a two minute continuous animated sequence."

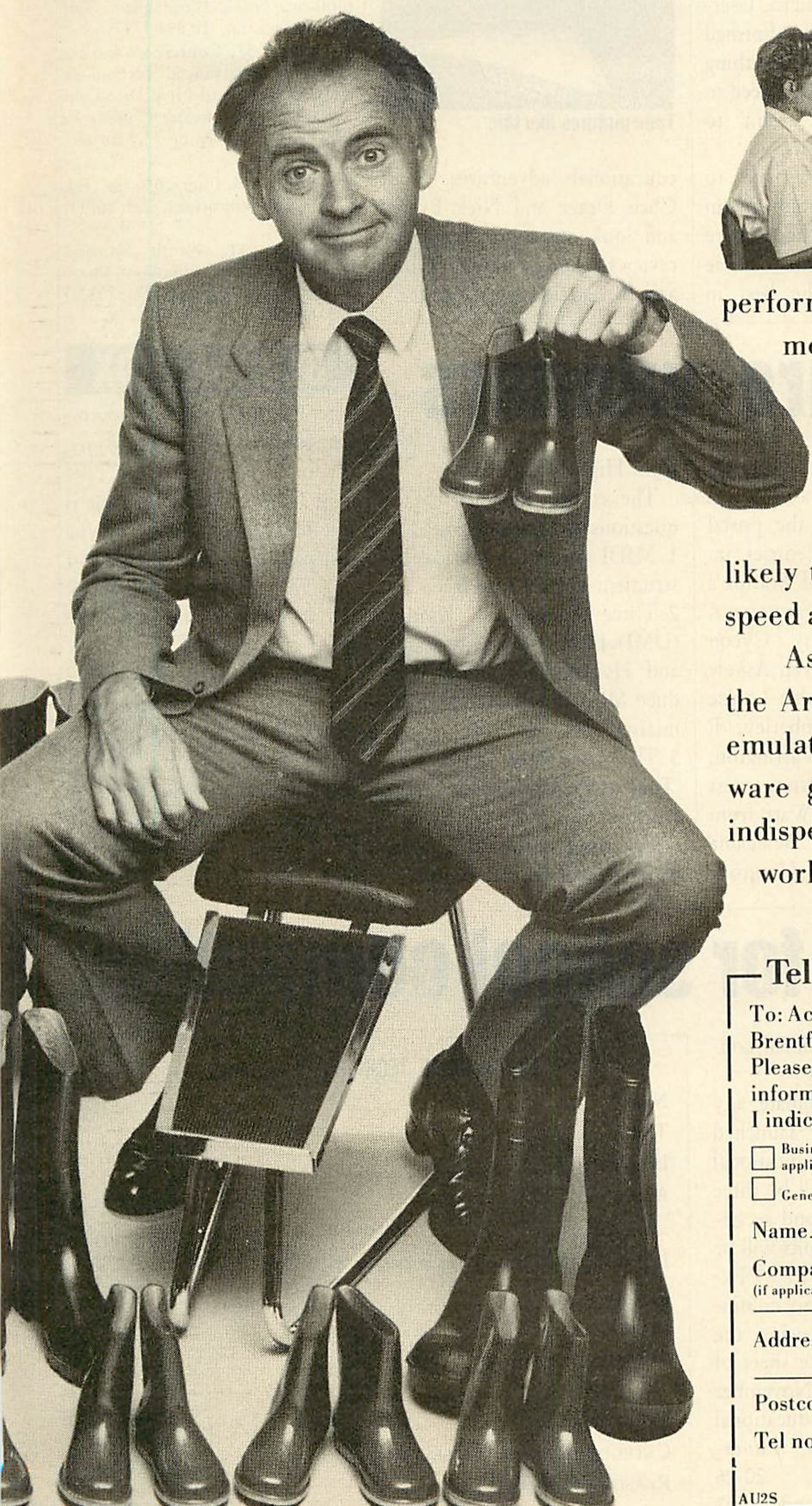


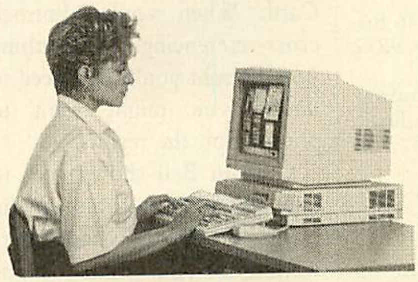
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**Colton Software**, Broadway House, 149-151 St Neot's Road, Hardwick, Cambridge CB3 7QJ.
Tel: (0954) 211472.
**Harlequin Ltd**, Barrington Hall, Barrington, Cambridge CB2 5RG.
Tel: (0223) 872522.
**Lindis International**, PO Box 10, Halesworth, Suffolk IP19 ODX.
Tel: (0986) 85476.
**Minerva**, 69 Sidwell Street, Exeter EX4 6PH.
Tel: (0392) 410137.
**Smalltalk Express**, Hyde House, The Hyde, Edgware Road, London NW9 6LA.
Tel: 01-200 0220.
**The Soft Option Ltd**, Elmtree Road, Teddington, Middlesex TW11 8TD.
Tel: 01-977 0272.
**Spacetech**, 21 West Wools, Portland, Dorset DT5 2EA.
Tel: (0305) 822753.
**Umusic**, 17 Parkfields, London SW15 6NH.
Tel: 01-788 3729.
**Video Electronics Ltd**, Wigan Road, Atherton, Manchester M29 ORH.
Tel: (0942) 882332.
**West Mercia Constabulary**, Police Station, Rubery, Birmingham B45 9JA.

# In next month's issue

Next month in *Acorn User* Joe Telford applies and explains the principles of hypertext in a program for your micro, UserCard. When you've finished cross-referencing everything you thought you'd ever need to know, you might want to photograph the results.

Graham Bell shows how to take better screen shots with an ordinary camera. While you're waiting for your prints to come back, check out the best in educational adventures from Chris Drage and Nick Evans, and look out for a bundle of reviews: games, video digitizer and Panasonic's latest printer.



**Take pictures like this**

# Erasure winners

Congratulations to the winners of our September Erasure competition, who beat the postal strike to get their entries in. Each wins a copy of Erasure's latest album, *The Innocents*. They were: Jeremy Cycon from Lowestoft, Steven Askew from Carlisle, Helen-Louise Windsor from Camberley, P Bradshaw from Warrington, William Mortada from west London, Benjamin Watt from Edinburgh, Omal Walgama from Enfield, and P Hargrove from High Wycombe.

The correct answers to the questions we posed were:
1. MIDI stands for Musical Instrument Digital Interface.
2. Three companies, Umusic (UMI), Electro Music Research and Hybrid Technology produce MIDI interfaces for BBC micros.
3. The completed lyric was: 'They used to talk about. . . the weather.'

The winners should by now all have received their album.

# Diary dates

**November 11-13.** Micro User Show, New Horticultural Hall, London SW1. Tel: Database Exhibitions, (0625) 87992.
**November 15-17.** Techmart Exhibition, NEC, Birmingham. Tel: Carole Jackson, 01-834 1717.
**November 17.** Conference and exhibition on Advanced Technology and Learning, and New Directions in Learning, Doncaster Conference Centre. Tel: Anne Swainston, (0302) 63784.
**December 6-8.** Interactive '88. Tel: PLF Communications. Tel: (0733) 558571.
**December 11.** North Scotland Computer and Technology Show, Music Hall, Aberdeen. Tel: (0224) 273161.

## BLUNDERBOX

The Telemap story in November got the pricing for *Shades*, the multi-user game on Telecom Gold wrong. The game is free during peak hours, so you just pay the standard BTG cost of 6.5p per minute. After 6pm, it's an extra 4p on top of the BTG 2p a minute.

And we gave the wrong number for Lindis International, whose *Presenter* software we reviewed last month. The correct number is (0986) 85476.

If you spot any blunders, do let us know. Phone *Acorn User* on 01-490 1444.

# Award scheme for school computing

Teachers have the chance to influence the use of computers in education by nominating their favourite products for the 1988 Educational Technology Awards, run by *Educational Computing* magazine. Hardware and software products will be assessed by two panels, one primary and one for secondary. Products will be judged on their potential to benefit teaching and education. The judges include educationalist Joe Telford, adviser for Lincolnshire Ron Jones, primary head Anne Liddle, teacher Lesley Moody, MESU's Ralph Tabberer and educational consultant Noel Whalley.

Teachers can nominate any piece of technology launched this year in the UK educational system, and there will be three awards for primary and secondary sectors. The results will be announced at the BETT 89 Exhibition in January. So nominate your favourite using the coupon, or a separate sheet of paper, by Tuesday, November 29 1988. Send it to: Educational Technology Awards, *Educational Computing*, 20-26 Brunswick Place, London N1 6DJ.

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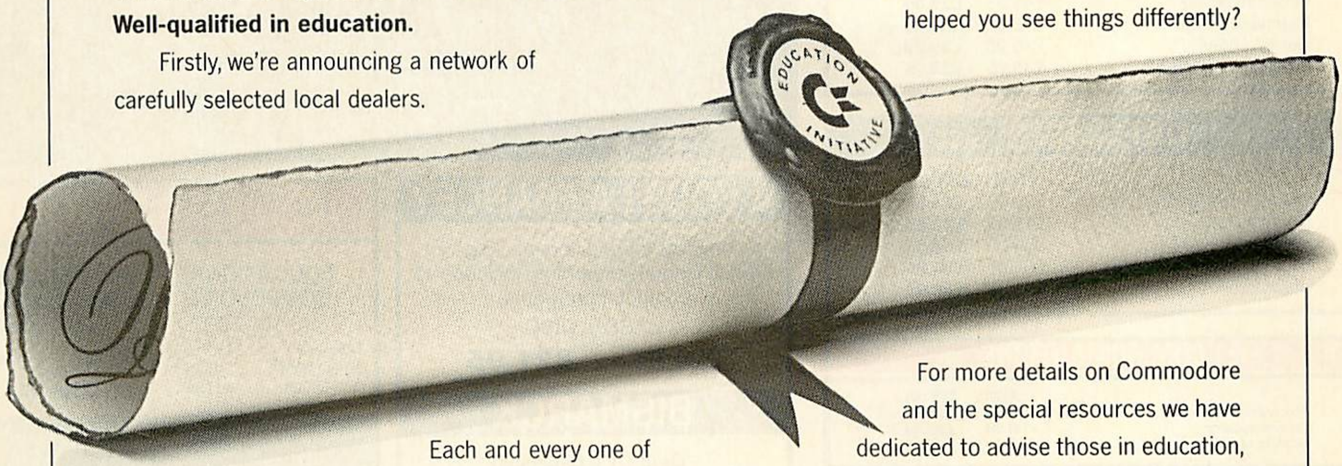
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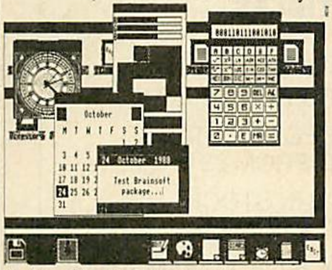
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# Beeb to Arc transfer works well

This Brainsoft package consists of a 3.5-inch Archimedes disc containing an 'enhanced' desktop and text editor, a 5.25-inch BBC Micro disc of software to enable Arc-to-Beeb file transfer, and an RS423 connecting cable. These components may be purchased in various combinations and the whole bunch is priced at £19 – too much for too little, I feel bound to say.




**Brainsoft's desktop screen**

The text editor is simple but effective and should be suitable for use with programming languages such as 'C'. One boon is that two text files can be edited together – quite handy when programming. The desktop is less impressive, including a Palace of Westminster-like clock and a rather feeble scientific calculator affair. I would suggest you invest your cash in a Casio instead.

The transfer software is functional but delicate. It's nice that the BBC disc catalogue is displayed in the desktop as if it were just an ordinary Archimedes directory. As a programmer however, I admit to losing patience with fragile programs such as this.

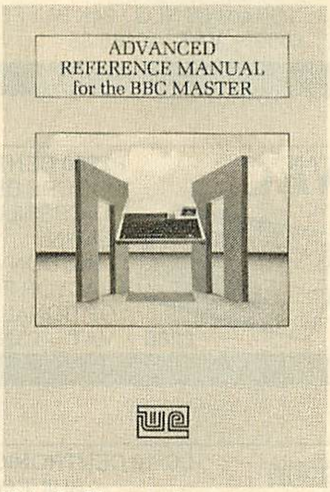
The manual supplied is comprehensive, though riddled with spelling and punctuation errors – not indicative of a product that's been thoughtfully put together. I really cannot recommend the Brainsoft package, although the flawless RS423 lead can be bought separately.

**Dave Acton**

# For Advanced users

The cover of this 290-page spiral-bound manual from Watford makes it look like the third volume of the *Master Reference* manual. This is exactly what it is: the book Acorn intended to release but never did.

The introduction warns you need a 'a good understanding of basic electronics and computer terminology', and the aim is to expand on the reference manuals for the benefit of peripheral designers and software writers. It does need to be used alongside with the original reference manuals. Information is tightly packed and highly technical. For instance, in the section dealing with sideways RAM, there is no overall view of how sideways RAM works on the Master – just a series of paragraphs clarifying subtle but important points on its use. The book is almost a series of technical footnotes on the main volumes, most of which is quite illuminating, but sometimes quite obscure.




**Not a bedtime read**

The book covers the Tube, Z80 and 80186 co-processors pretty throughly, and ANFS. Other topics, like interfacing, are also given adequate coverage. And there's a circuit diagram for the Master 128.

The book is not particularly well organised, though the text is clear in meaning. Some diagrams are properly drawn, but others are reproduced directly from Acorn data sheets – you know they are correct, but it looks a little amateur. Beware of assuming the answer to all problems are within – the introduction mentions an appendix detailing differences between Master and Electron, but it doesn't appear. Nor does the section on Viewsheet data representation. And there are errors, for example relating to *FX96 which controls XON, XOFF protocol on the serial port. This is understandable, because the original Acorn data sheets are incorrect, but there is no substitute for being right.

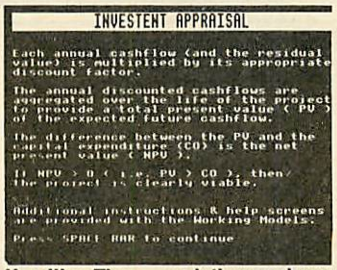
Overall, this book is good, but not to be given a blanket recommendation. It is for specialists who need exact technical details on the Master series – and if you have just a single simple problem you might balk at paying £19 for the solution. It isn't quite up to the standard of *Advanced User Guide*, but fulfils a real need for dedicated hobbyists and professionals.

**Peter Voke**

# An interest in money

'Discounted cash flow' is a technique that allows you to make financial decisions about the future. In essence, it allows you to work out what £100 next year is worth today, how much could you borrow if you promise to pay back £100 in a year, or how much would you have to invest now to make £100 in a year.

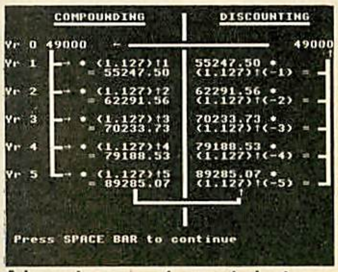
It all hinges on the interest rate, and so does RBRC's *Handling Time*. It doesn't provide enough encouragement to learn. The software, which is intended to be of use without the manual, is a series of structured explanations and examples that seek to explain the workings of compound interest and discounting, and their




**Handling Time – cash then and now**

meaning to business decisions.

There isn't enough explanation of terms like 'amortisation' to use the software without prior discussion, so a teacher is still vital. But the worked examples do give good experience of working out discount rates and a company's choice between leasing and buying a piece of equipment (eg, a new machine) is illustrated well.

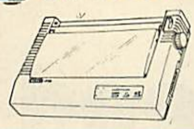



**A boon to accountancy students**

The mode 7 screen used for the worked examples isn't best suited to showing mathematical formulae, as the screendump shows, particularly as you can't have superscripts and spelling errors mar the presentation. For sixth form or college students studying accountancy or business studies it is a reasonable source of practice examples.

**Graham Bell**

# A C E



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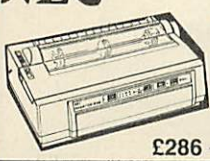
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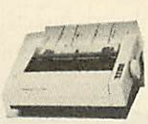
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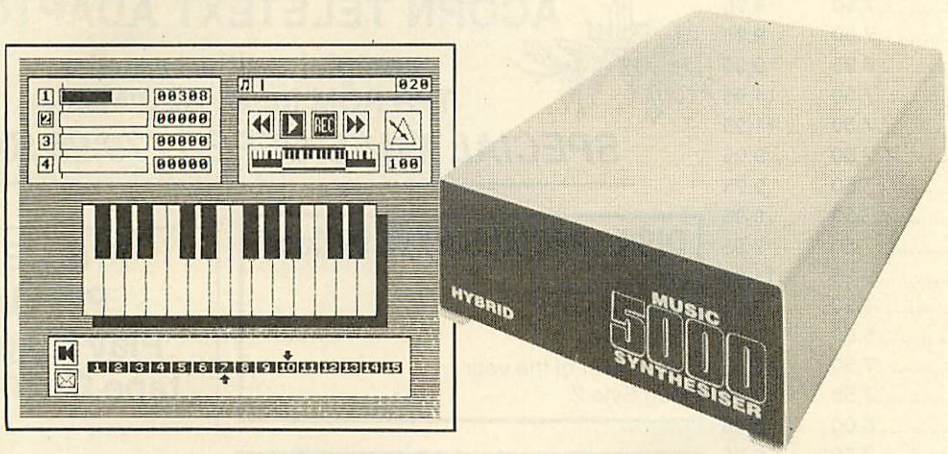
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***Chris Jordan***




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2 Which of the following films' incidental music was electronic?
a *Metropolis* **b** *Forbidden Planet* **c** *The Day the Earth Stood Still*

3 Which of the following pieces used an early music synthesiser?
a Cage's *4'33"* **b** Messiaen's *Turangalila* **c** Stockhausen's *Stimmung*

4 Which of the following did pioneering work with computers in music?
a Robert Moog **b** David Bristow **c** Peter Zinoviev

5 Which of the following was the first magazine to present a type-in AMPLE program for a full-length piece?
a *Electronics and Music Maker* **b** *Electronic Soundmaker and Computer Music* **c** *Acorn User*

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All entries must arrive by February 6 and the editor's decision is final. Write the answers to the questions along with your name and address on the back of an envelope and enclose your winning idea inside plus the coupon below.

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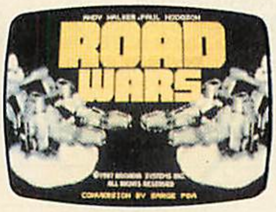
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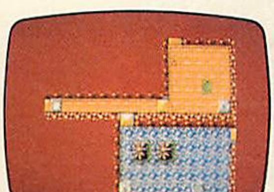
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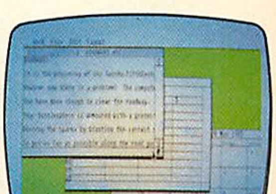

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| MR6000 Master ROM Cartridge. Allows 4 ROMS to be fitted | £11.95 |
| MR7200 Master RAM Cartridge 32k W/P Sideways Cartridge | 33.95 |
| MR8000 Master RAM Cartridge 64k Battery Backed S/Ways RAM | 49.95 |
| MR3000 Mini ROM Board BBC B Only. Extension of 4 ROMs in the BBC | £15.95 |
| MR4300 Mini ROM/RAM Board BBC B 32k S/Ways + 3 ROM Sockets | £39.95 |
| MR4800 Mini RAM Board BBC B Only 128k Battery Backed S/Wavs | £89.95 |

## Printer Ribbons and Accessories

| | |
|---|---|
| Epson LX 86 (Compact) | £2.50 (e) |
| Epson MX 80/RX 80/FX 80/FX 80/85 (Compact) | £3.00 (e) |
| Juki 5510/Citizen MSP 20 (compact) | £3.00 (e) |
| Citizen 120D/LSP10 | £3.75 (e) |
| Taxan 810/Canon (Compat) | £3.75 (e) |
| Juki 6100 Multistrike | £2.30 (e) |
| Tally MT85 Fabric | £5.00 (e) |
| Tally MT86 Carbon | £7.00 (e) |
| Printer lead 1.5m B/B+/M128/ELK + 1 | £6.00 (e) |
| Printer lead 1.5m Compact | £8.00 (e) |
| Printer lead 1.8m IBM or Archimedes Compatible | £10.00 (d)) |
| 80col Printer Stand with paper shelves | £29.00 (c)) |
| Printer Switch Box 2 Way "T" Switch | £34.00 (c) |

## Modems

**All Modems inc BBC Lead**

| | |
|---|---|
| Miracle WS2000 | £95.00 (c) |
| Miracle WS4000 Hayes Compat | £144.00 (a) |
| Pace Commstar II ROM | £28.00 (e) |
| Pace Linnet | £124.00 (c) |
| Pace Series 4 2123s | £230.00(a) |

## Software

**Acorn Soft**

| | | | |
|---|---|---|---|
| Micro Prolog | £50.00 (d) | ISO Pascal | £42.00 (d) |
| Logo | £44.00 (d) | BCPL | £39.00 (c) |
| View Printer Driver (D) | £8 (e) | Comal | £32.00 (d) |
| Lisp | £33.00 (e) | Hi View | £37.00 (d) |
| View professional | £75.00 (c) | View 3.0 | £39.00 (d) |
| Viewsheet | £37.00 (d) | View Store | £37.00 (d) |
| View Spell (80T only) | £29.00 (d) | View Plot | £21.00 (e) |
| View Index | £10.00 (e) | Overview | £69.00 (c) |
| 1st Word Plus (Arch) | £75 (c) | Logistix (Arch) | £95 (d) |

**Computer Concepts**

| | | | |
|---|---|---|---|
| Interword | £39.00 (d) | Inter Sheet | £39.00 (d) |
| Interchart | £26.00 (d) | Interbase | £49.00 (d) |

**Archimedes versions available – call for price and availability**

| | | | |
|---|---|---|---|
| Mega 3 | £75.00 (c) | Spellmaster | £42.00 (d) |
| Wordwise | £30.00 (d) | Wordwise + | £37.00 (d) |
| **Mirrorsoft** | | | |
| Fleet Street Editor | £31.00 (d) | Fonts and Graphics | £11.75 (e) |
| **Clares** | | | |
| Fontwise + | £16.00 (e) | Replica III | £11.00 (e) |
| VINE MICRO REPLAY (State M/C and Disc Interface) | | | £30.00 (e) |
| Artisian (Arch) | £31 (e) | Artisian Support | £16 (e) |

**NB It is essential to state machine and 40/80T when ordering software**

## Books (No VAT on books)

| | | | | | |
|---|---|---|---|---|---|
| Master Ref. Manuals Pt1 | £14.00 (d) | Pt 2 | | | £14.00 (d) |
| Advanced Master ref Manual (Bray & Dickens) | | | | | £19.95 (d) |
| Lisp | £8.00 (e) | Forth | £8.00 (e) | ISO Pascal | £8.00 (e) |
| BCPL | £14.00 (d) | View Guide | £6.00 (e) | Into View | £6.00 (e) |
| View 3 | £9.00 (e) | View Sheet | £9.00 (e) | View Store | £9.00 (e) |
| Archimedes Ref manual | | | | | £29.95 (d) |
| Arm assembly language manual | | | | | £12.95 (e) |
| Mastering View ViewSheet and ViewStore | | | | | £12.95 (e) |
| Understanding Inter Word | | | | | £6.50 (e) |
| View – A Dabhand Guide | £12.95 (e) | Z88 Computing | | | £9.95 (e) |

## Fanfold Paper and Labels

| | |
|---|---|
| 2000 x 1 Part 60gm 11 x 9.5" Micro Perf | £12.00 (c) |
| 1000 x 1 Part 85gm 11 x 9.5" Micro Perf | £9.00 (c) |
| 1000 x 1 Part 90gm "Perfect" A4 Micro Perf | £12.00 (b) |
| 1000 89mm x 36mm Labels | £4.00 (d) |
| 1000 89mm x 49mm Labels | £6.00 (d) |
| 1000 102mm x 36mm Labels | £5.00 (d) |

*Please state Single or Twin Row when ordering labels*

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**MENTOR THE MASTER COMPATIBLE SYSTEMS THAT OFFER YOU MORE FOR YOUR MONEY**
**INTRODUCING 12 NEW HARD DISC MODELS**

Mentor Computer systems are 100% Acorn Master 128 compatible and they are used in industry, commerce, education, research, and the home. They can be networked and have all the standard i/o ports available at the rear of the computer, and internally they will accept all co processors, turbo board 512 board etc, plus all third party add-ons. If required Mentors can be fitted with 3½ inch disc drives at no extra cost, finally we are pleased to quote for the assembly of bespoked systems to your exact requirements. All systems are covered by our 12 month warranty. Hard disc ****20sc will not accept a second hard disc, whereas ****20st will.

| Standard Models | No Monitor | Mono Monitor | Colour Monitor | |
|---|---|---|---|---|
| Model 2800 no drives | £349.00 | £424.00 | £638.00 | p&p £14.00 |
| Model 2801 one 40/80t drive | £429.00 | £504.00 | £718.00 | p&p £14.00 |
| Model 2802 two 40/80 drives | £509.00 | £584.00 | £798.00 | p&p£14.00 |
| Model 2820sc one 40/80t drive and 20 Mb wini | £798.00 | £873.00 | £1087.00 | p&p £14.00 |
| Model 2820st one 40/80t drive and 20 Mb wini | £829.00 | £904.00 | £1118.00 | p&p £14.00 |
| Model 2840st one 40/80t drive and 40 Mb wini | £998.00 | £1073.00 | £1287.00 | p&p £14.00 |
| Model 2860st one 40/80t drive and 60 Mb wini | £1098.00 | £1173.00 | £1387.00 | p&p £14.00 |

**OAK WINCHESTER DISC DRIVE SYSTEMS**

The Oak Winchester Hard Disc Subsystems are ready to plug in and use on all OAK and Acorn BBC B, B + and Master series computers. For the BBC B, and B + models you simply need to fit Acorn ADFS rom, if you will require to use a floppy disc with the above models you will require the Western Digital 1770 Disc controller which works in conjunction with the ADFS. The OAK Winchester hard disc subsystems are 100% compatible with the Acorn Winchester and ADFS, the Acorn Master 512 board with DOS Plus and the SJ Research file server. Drive 1 a second Winchester is available for backup or extra storage it comes complete with easy to follow fitting instructions. OAK Winchester hard disc subsystems comprise; the Winchester disc unit, case, power supply, controller and host adaptor cards, all cables, hard disc utilities and user guide, 12 MONTHS WARRANTY. PLEASE SPECIFY WHEN ORDERING FOR AN SJ RESEARCH FILESERVER.

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|---|---|---|---|
| 20 Mb OAK Wini | £430.00 p&p £10.00 | 20 Mb OAK Wini dr 1 | £330.00 p&p £10.00 |
| 28 Mb OAK Wini | £499.00 p&p £10.00 | 28 Mb OAK Wini dr 1 | £399.00 p&p £10.00 |
| 40 Mb OAK Wini | £599.00 p&p £10.00 | 40 Mb OAK Wini dr 1 | £499.00 p&p £10.00 |
| 56 Mb OAK Wini | £659.00 p&p £10.00 | 56 Mb OAK Wini dr 1 | £559.00 p&p £10.00 |
| 60 Mb OAK Wini | £699.00 p&p £10.00 | 60 Mb OAK Wini dr 1 | £599.00 p&p £10.00 |
| 75 Mb OAK Wini | £799.00 p&p £10.00 | 75 Mb OAK Wini dr 1 | £699.00 p&p £10.00 |

**SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER**

20 Mb Oak Winchester .......... £299.00 p&p £10.00

A complete hard disc subsystem its only draw back it cannot be expanded to except a second drive, ie SCSI interface. Not manufacturer rejects the same maker as above comes complete with; st225n Winchester unit, case, power supply, host adaptor card, all cables, hard disc utilities and user guide, and 12 months warranty.

WE REGRET THAT WE ARE UNABLE TO ACCEPT CREDIT CARDS ON THIS SPECIAL OFFER.

Individual Data Sheets are available, free of charge, by written request, or by telephone, by quoting the product name.

**OAK DISC DRIVES FOR THE BBC COMPUTER**

Oak disc drive systems comprise; Mitsubishi double sided disc drives, capable of both single and double density, 40/80 track switchable, house in metal cases, colour matched to the BBC computer and include all cables, manual and utility disc and are covered by our 12 month warranty

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| 400K Single Drive, 40/80t, double sided | £85.00 p&p £6.00 |
| 800K Dual Drives, 40/80t, double sided, (rear switches) | £165.00 p&p £8.00 |
| 800K Dual Drives, 40/80t, double sided, (front switches) | £180.00 p&p £8.00 |
| 800K Dual Drives, 40/80t, (front switches) with power supply | £215.00 p&p £8.00 |

**3½ INCH DISC DRIVES**

| | |
|---|---|
| 400K Single Drive | £83.00 p&p £6.00 |
| 800K Dual Drives | £170.00 p&p £8.00 |
| 800K Dual Drives with power supply | £199.00 p&p £8.00 |

**MIXED 5¼ AND 3½ INCH DRIVES**

| | |
|---|---|
| 800K Dual Mixed Unit, 5¼ inch 40/80t, double sided, drive housed with 3½ inch, double sided drive, (switch at rear) | £175.00 p&p £8.00 |
| 800K Dual Mixed Unit, 5¼ inch 40/80t, double sided, drive housed with 3½ inch double sided drive, (switch on front) | £190.00 p&p £8.00 |
| 800K Dual Mixed Unit, 5¼ inch 40/80t, double sided, drive house with 3½ inch double sided drive, with power supply (switch on front) | £225.00 p&p £8.00 |

**SECOND HAND COMPUTERS**

We always have stocks of reconditioned BBC B and Master 128 computers. Please ring for current stock.

| | |
|---|---|
| BBC model B, with DFS from | £249.00 p&p £8.00 |
| Master 128 from | £295.00 p&p £8.00 |

**BITS AND PIECES**

| | |
|---|---|
| New uncased 5¼ inch 40/80t, half height, DSDD, Mitsubishi disc drive | £67.00 p&p £5.00 |
| New uncased 3½ inch one third height DSDD disc drive | £62.00 p&p £5.00 |
| 3½ inch to 5¼ inch adaptor kit | £18.00 p&p £2.50 |
| New uncased Seagate ST225N 20 Mb hard disc drive | £235.00 p&p £8.00 |
| New uncased Seagate ST225 20 Mb hard disc drive | £189.00 p&p £8.00 |
| New uncased Seagate ST251 40 Mb hard disc drive | £308.00 p&p £8.00 |
| New uncased Seagate ST277 60 Mb hard disc drive | £420.00 p&p £8.00 |

THE ABOVE DRIVES AND WINCHESTERS ARE COVERED BY A 12 MONTH WARRANTY

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| Hard Disc controller card | £145.00 p&p £3.00 |
| Oak hard disc host adaptor & software ADFS compatible | £55.00 p&p £3.00 |
| Single disc drive case | £7.00 p&p £2.50 |
| Dual disc drive case with provision for rear switches | £14.00 p&p £2.75 |
| Dual disc drive case with provision for front switches and power supply | £19.50 p&p £3.25 |
| Hard disc case with provisions for PSU & FAN | £29.00 p&p £3.25 |
| Dual drive power supply for above case | £35.00 p&p £4.00 |
| Winchester hard disc power supply to fit above case | £45.00 p&p £4.00 |
| Single disc drive power cable | £2.95 p&p £1.00 |
| Dual disc drive power cable | £3.65 p&p £1.00 |
| Single disc drive data cable | £3.95 p&p £1.00 |
| Dual disc drive data cable | £5.95 p&p £1.00 |

**BBC B AND BBC B PLUS SPARES**

| | |
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| Keyboard | £25.00 p&p £3.50 |
| Power supplies | £38.00 p&p £3.50 |
| Plastic cases | £12.00 p&p £3.00 |
| 17 way keyboard connector | £1.00 p&p £0.50 |
| Plastic key strip | £2.00 p&p £1.00 |
| Speaker grill | £1.00 p&p £0.50 |
| Speaker assembly | £2.75 p&p £0.50 |

**MASTER SPARES**

| | |
|---|---|
| Keyboard | £56.00 p&p £3.50 |
| Motherboard | £246.00 p&p £3.50 |
| Power supply | £51.00 p&p £3.50 |
| Speaker assembly | £2.75 p&p £0.50 |
| Battery pack | £2.75 p&p £0.50 |

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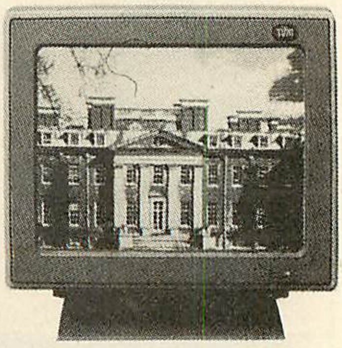
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| A305 | £725 |
| A310 | £860 |
| A310M | £923 |
| A440 | £2599 |

with Acorn or Philips CM8833 colour monitor, please add £227 (CM8833 has CBVS input for TV picture), £345 for QUADRAM colour multisync, £183 for TVM MG-11 greyscale multisync.

***Full Acorn price list is available on request.***

## BBC Upgrades

| | |
|---|---|
| 1772 double-density disc interface | £35.00 |
| 1772/8271 DFDC (requires Acorn 8271) | £45.00 |
| Solidisk DFS 2.2 ROM | £10.00 |
| Solidisk ADFS+DFS two-ROM set | £20.00 |
| 40/80 track switchable double-sided drive | £119.00 |
| Twin 40/80 track drives in a bridge | £338.00 |



MG-11

## The Multi-function Twomeg 128K

*This new style TWOMEG 128K board is the best ever solution for memory upgrades. It combines a ROM expansion, a Sideways RAM and a Shadow RAM on a single board, offering:*

- 8 ROM sockets (4 on the TWOMEG board, 4 on the BBC motherboard).
- 8 Sideways RAM banks (4-7, C-F).
- can be fitted with only 64K RAM (banks C-F).
- 4 of the RAM banks (4-7) can be used as a RAM disk with Solidisk DFS or ADFS.
- 2 of the RAM banks (C-D) can be used as a Shadow RAM and a small (8K) Sideways.
- any bank can be used as a printer buffer.
- Write Protect switch for Sideways software.
- in the included software: MENU, MANAGER, Printer Buffer.

Easy installation: simply remove the 6502, drop in the board and push three wires onto the middle pins of S20, S21 and S22.
ABSOLUTELY NO CUTTING, NO CLIPS, OR SOLDERING.

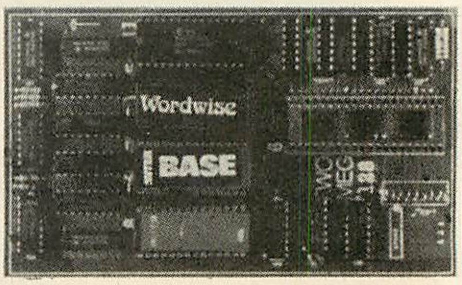
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Mains powered, can display TV picture and sound on Philips monitors.

**Free ATS ROM image and manual for all BBC's.**

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# Meet the Morley Family...

## Teletext Adapter

The adapter is housed in a plastic disc drive style case, similar in colour to the BBC micro. It connects to the User Port via a 4-way ribbon cable and can take its power either from the computer or from our optional power supply.
The unit comes with the ATS (advanced teletext software) written for us by the BBC. The HOLD PAGE and REVEAL features are implemented, and pages can be saved to disc under your own file names.
Telesoftware is catalogued and selected from the Menu page, and the programs are easily downloaded.
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLD-WIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

| | |
|---|---|
| Adapter BBC/Master | £104.20 |
| Adapter Compact | £120.00 |
| Adapter RML Nimbus | £104.20 |
| Optional Power supply | £8.80 |
| Teletext Utility Disc | £5.20 |

## EPROM Programmer V2

This state-of-the-art unit, allows programming of 2764, 27128 and 27256 EPROMS both 12.5 and 21 volt. Totally under software control it is believed to be one of the fastest programmers available today.
The comprehensive user-friendly software included in the package has two main parts. The first allows EPROMS to be read, programmed, verified, and edited, also allowing a ROM image to be loaded or saved. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

£30.00

Eprom programmer utility disc – Put all your favourite routines into Sideways Rom, both BASIC and M/Code allows multiple programmes up to 16k with separate * commands for initialisation and help.

£5.20

## Master Board "AA"

At long last the add-on all MASTER users have been waiting for, an internal ROM board.
No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.
The all new MORLEY MASTER BOARD "AA" allows you to have up to 8 x 16k and 4 x 32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permenantly, with the addition of your standard 4 x sideways ram banks and four banks by using cartridges.
*A staggering 32 ROM images installed and accessible at any time.*
Included in the package is a utility ROM which has many useful features including a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

£40

## The Latest Arrival...

**<u>The Morley range of Winchester Drives</u> are completely compatible with all BBC's, B+'s and Master computers fitted with ADFS.**
**Each unit comes complete with a utility disc containing format, verify, archive, initialise and an intelligent file copy including DFS files to hard disc.**
**Finished in high quality colour co-ordinated case with a whisper quiet internal fan and switch mode power supply.**
**Superb quality and competitive cost – in a word – "Morley"!**

| | |
|---|---|
| **20 Megabyte** | **£370** |
| **30 Megabyte** | **£420** |
| **40 Megabyte** | **£500** |
| **60 Megabyte** | **P.O.A.** |

## RAMDISC

Due to the rise in prices of dynamic RAM chips we only have a limited stock of the 1 megabyte version of this device left. Special offer price while stocks last.

£150.00

## Master Cartridge

from Care

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|---|---|
| Dual cartridge 2 sockets | £9.00 |
| Quad cartridge 4 sockets | £14.00 |
| Duet cartridge 2 x 32k sockets | £12.00 |
| 32k non-volatile ram cartridge ideal for Spellmaster dictionary | £33.00 |

## Software

We now stock a full range of computer concepts software and will gladly populate your 'AA' board or cartridge before despatch.

## Master Smart Cartridge

THE MORLEY/CARE SMART CARTRIDGE
The Smart Cartridge will at the press of a button halt a program running in memory and execute any one of a host of useful built-in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
Some of the built-in features (at the press of a button):
*Autosaves comnputer's entire memory.
*Freeze program at any point.
*Screen dump (any mode) to printer or disc.
*Allows most protected software to be backed-up including tape to disc and disc to tape.
*User friendly menu driven software etc.

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**COMING SOON...**

**Master Speech Cartridge**

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## ARCHIMEDES, BBC COMPUTERS & ECONET REFERRAL CENTRE

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| Archimedes 305 Basic | £685(a) |
| Archimedes 310 Basic | £799(a) |
| Archimedes 440 Basic | £2,399(a) |
| Acorn Mono Monitor* | £60(a) |
| Acorn Colour Monitor* | £220(a) |
| Philips CM8833 Col Monitor* | £210(a) |
| PC Emulator Software* | £60(b) |

**Prices applicable only when purchased with the computer*

**ADD-ONS**

| | |
|---|---|
| 0.5Mb Ram upgrade kit (for 305) | £144(b) |
| 2nd Floppy Drive (305, 310) | £118(b) |
| Backplane for 2 podules | £37(c) |
| Atom wide Backplane 4 slots | £49(c) |
| Cooling Fan for AW Backplane | £10(d) |
| I/O Podule | £80(c) |
| 20Mb Hard disc + podule | £469(a) |
| Acorn ROM Podule | £55(c) |
| CC ROM Podule | £45(c) |
| Midi Addon to I/O | £37(c) |
| Midi Expansion Card | £66(c) |
| Econet Network Module | £43(d) |
| Archimedes Printer Lead | £7(d) |
| Archimedes Colour Monitor Lead | £7.50(d) |
| IEEE Interface Podule | £283(b) |
| 16 Bit Parallel I.O Card | £195(b) |
| Dual RS232 Card | £195(b) |
| Armadillo Sound Sampler | £105(b) |
| Fourier Transform Software | £40(d) |
| ARC/BBC Serial Link | £25(d) |
| ARC External Drive Adaptor | £30(d) |
| External 5.25 Drive | £104(b) |

**BOOKS: *(no VAT)***

| | |
|---|---|
| Arc. Ref Manual | £29(b) |
| Arc. Assembly Lang. Prog. (DABS) | £14.95(b) |
| Inside Autosketch | £15(b) |

**SOFTWARE:**

| | |
|---|---|
| PC Emulator Version 1.20 *(includes MS-DOS 3.2)* | £99(d) |

**LANGUAGES:**

| | | | |
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| ANSI C | £95(c) | ISO PASCAL | £95(c) |
| Prolog X | £181(b) | FORTRAN 77 | £95(c) |
| LISP | £181(b) | COMAL | POA |

**PROGRAMMERS TOOLS:**

| | |
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| TWIN *Editor* | £29(d) |
| Toolkit Plus Module | £41(d) |
| Software Dev T/Box | POA |
| Software Dev Debug T/box | POA |
| Archimedes Assembler | £199(b) |

**WORDPROCESSORS**

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|---|---|---|---|
| First Word Plus | £79(d) | View SKM31 (e) | £47(d) |
| Graphics Writer | £27(d) | Interword (e) | £35(d) |
| PipeDream | £99(d) | Wordwise + | £20(d) |

**SPREADSHEETS**

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| Logistix *(Includes spreadsheet/database/timesheets/graphics)* | £95(d) |
| Matrix 3D *(3 Dimensional s/sheet with 19k col, 10k row & 100 pages)* | £79(c) |

| | | | |
|---|---|---|---|
| Sigmasheet | £59(d) | Viewsheet SKM7 (e) | £47(d) |
| Intersheet (e) | £35(d) | | |

**DATABASES**

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|---|---|---|---|
| Deltabase | £26(d) | Viewstore SKM07 (e) | £47(d) |
| System Delta + | £57(c) | Alphabase | £39(d) |
| Prog Ref Guide | £26(c) | | |

| | |
|---|---|
| Support modules for System Delta Plus each | £35(d) |
| CC MEGA 3 For Arc | £79(c) |

**ACCOUNTING SOFTWARE**

| | |
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| Minerva's suite 5 Modules (ea) | £54(d) |

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## Special Offer

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The voucher can be redeemed against any future purchase from us (inc Arc monitor, PC Emulator (at £60), discs, cables, paper etc.)

**OR**
**included free within the price**

Autosketch CAD package, Inside Autosketch book & 2 boxes of 3M 3.5" DS Discs.

Additionally we will offer discounts up to 10% on Archimedes hardware stocked by us.

**0% FINANCE with 12 months to pay**

For a limited period we are able to offer 0% (APR) finance on any Archimedes purchased at Acorn's RRP. Payments can be spread over a 12 month period with no interest to pay. Offer subject to status. Please ask for full details.
*Technomatic Ltd are a Licensed credit brokers*

**GRAPHICS/ART/CAD**

| | | | |
|---|---|---|---|
| Artisan | £30(d) | GammaPlot | £30(d) |
| Artisan Support | £17(d) | System GammaPlus | £59(d) |
| Autosketch | £69(d) | Interchart (e) | £25(d) |
| Presenter | £24(d) | Prof Artisan | £POA |

**GAMES:**

| | | | |
|---|---|---|---|
| Zarch | £17(d) | Minotaur | £11(d) |
| Hoverbod | £13(d) | Missile Control | £13(d) |
| Conqueror | £24.95(d) | Enthar Seven | £29.00(d) |
| Orion | £13(d) | Freddy's Folly | £13(d) |

Dust cover for Archimedes systems £12.50(d)

Software packages marked with (e) run under 6502 emulated mode.

*Please check on availability of some of the above packages*

**technoCAD**

***To be launched soon***

The most comprehensive CAD system for the Master. Host of innovative features for creating complex drawings, pcb layouts, sketches etc. Virtually no restrictions on drawing sizes. On screen scaling for plotters, variety of screen dumps for compatible printers.

**FREE**

evaluation on disc available. The disc contains operating instructions and will perform as release version except for file functions.

## MASTER SERIES

| | |
|---|---|
| **AMB15** Master 128K | £356(a) |

**We include *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.**

| | |
|---|---|
| **ADC06** Turbo 65C102 Module | £115(b) |

| | | | |
|---|---|---|---|
| ADF10 Econet Module | £40(c) | Acorn Rom Cartridge | £13(d) |
| ADJ22 Ref Manual I | £14(c) | ADJ23 Ref Manual II | £14(c) |
| View User Guide | £8.50(d) | V/sheet User Guide | £8.50(d) |
| TRC2 ROM Cart | £7.50(d) | TRC4 4ROM Cartridge | £11(d) |
| TRC32 32K RAM Cart. | £21(d) | Master Dust Cover | £4.75(d) |

| | |
|---|---|
| Acorn IEEE Interface (for B, B+ Master) | £265(b) |
| Universal CoProc Adapter | £49(b) |
| BBC Domesday System | £3,750(2×a) |

**CANON PW1080A PRINTER including BBC Master Lead £149(a)**

## MASTER COMPACT

128K RAM, 640K 3.5" DS Drive + Educ software and our bundled Educ/Fun package included

| | |
|---|---|
| **SYSTEM 1** Entry System | £310(a) |
| **SYSTEM 2** with 12" Mono Monitor | £365(2×a) |
| **SYSTEM 3** with 14" Col Monitor | £475(2×a) |

| | | | |
|---|---|---|---|
| 2nd Drive Kit | £90(c) | Serial Kit | £25(d) |
| Mertec Adaptor | £35(c) | TV Modulator | £26(d) |
| Ext Drive Adaptor | £9(d) | Printer Lead | £7(d) |

## ECONET ACCESSORIES

**New Acorn Filestore to be released soon. Phone for details.**

| | |
|---|---|
| **ECOLINK Card** | £299(b) |

*Full spec on request*
(PX/XT/AT interface card for connection to Econet network)

| | | | |
|---|---|---|---|
| Econet Starter Kit | £85(b) | Econet Bridge | £174(b) |
| Econet Socket Set | £29(c) | Printer Server Rom | £41(d) |
| File Server Level II | £75(b) | 10 Station Lead Set | £26(d) |
| Master FS Utility Disc | £17.25(d) | | |

## UPGRADE KITS

| | | | |
|---|---|---|---|
| 1.20S ROM | £15(d) | ADFS ROM | £26(d) |
| DNFS ROM | £19(d) | 1770 DFS Kit | £49(d) |
| BASIC II ROM | £22.50(d) | Econet Kit | £55(d) |

## EPROMS/RAMS

| | | | |
|---|---|---|---|
| 2764-25 | £2.80 | 27256-25 | £6 |
| 27128-25 (12.5vVpp) | £4.50 | 27128-25 (21vVpp) | £6 |
| 27512-25 | £9 | 6264LP-15 | £6 |

*These prices subject to change* (Carriage code d)

## RAM/ROM EXPANSION

| | |
|---|---|
| **ATPL Board** for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS | £37(c) |
| ATPL Battery backup kit | £18(d) |
| ATPL Board for BBC+ (10 Roms) | £31(c) |

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

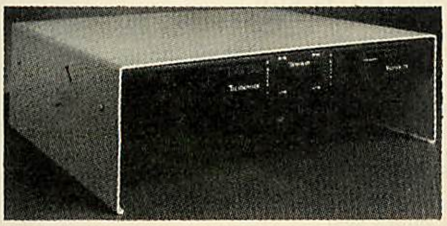
# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

# TECHNOMATIC DISC DRIVES




**TS 400**



**PD 800P**

For users who do not need 40/80 switching capability, please specify as such and add suffix N on our product code. Drive price will be reduced by £5/mechanism.

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.

**5.25" Single Drives 40/80 switchable:**
**TS400** 400K/640K — **£90(b)**

**PS400** 400K/640K with integral mains power supply — **£101(b)**

**5.25" Dual Drives 40/80 switchable:**
**TD800** 800K/1280K — **£170(a)**

**PD800** 800K/1280K with integral mains power supply — **£190(a)**

**PD800P** 800K/1280K with integral mainspower supply and monitor stand — **£209(a)**

**3.5" 80T DS Drives:**
**TS351** single 400K/640K — **£75(b)**

**PS351** 3.5" single drive with integral mains power supply in a 5.25" case. — **£95(b)**

**TD352** Dual 800K/1280K — **£139(b)**

**PD352** 3.5" dual drive with integral mains power supply in a 5.25" case. — **£149(b)**

**Combo Drives (5.25" & 3.5" drives)**
**PD853** with integral psu — **£180(a)**
**PD853P** with integral psu — **£205(a)**

**DISC DRIVE MULTIPLEXER**
***For Master, B, B+ and any DFS/ADFS***
**TDM2** Two computers/one drive unit — **£65(b)**
**TDM4** Four computers/one drive unit — **£115(b)**

# TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Files can be loaded by pointing at the icon.

*Larger capacity drives available on request.*

**P20HD TECHNOMATIC 20 Mbyte Winchester Drive** — **£419(a)**

**P30HD** 30Mb Winchester Drive — **£435(a)**

**P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM** — **£669(a)**

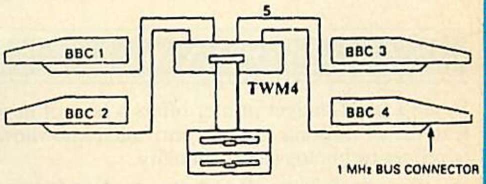
**P204HP TECHNOMATIC 20 Mbyte Winchester** and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. — **£609(a)**

**P2041HT** As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. — **£1179(a)**

**TS10 10** Mbyte Tape Streamer Backup unit with utilities. — **£546(a)**

**TFC10** 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. — **£21(d)**

**WINCHESTER Drive Multiplexer**




These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers. — **£99 (b)**
TWM4 for four Computers. — **£149 (b)**

**NEW** **Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master.** — **£435(a)**

## BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box. — **£25(b)**

50 5.25" 80 T double sided discs with sleeves in lockable box. — **£32(b)**

50 3.5" 80T double sided discs with sleeves in lockable box. — **£60(b)**

**FLOPPICLENE DRIVE HEAD CLEANING KIT**
**5.25" Kit** with 20 disposable discs — **£14.00(d)**
**3.5" Kit** with 20 disposable discs — **£14.75(d)**

**DISC STORAGE BOXES**
**DB340** Lockable 40 × 3.5" — **£8.50(c)**
**DB550** Lockable 50 × 5.25" — **£6.50(c)**
**DB570** Lockable 70 × 5.25" — **£8.50(c)**
**DB5100** Lockable 100 × 5.25" — **£10.50(c)**

# 3M FLOPPY DISCS




| 5.25" Discs in packs of 10 | |
|---|---|
| 744 40T SS DD | £6.50(d) |
| 745 40T DS DD | £8.00(d) |
| 746 80T SS DD | £12.00(d) |
| 747 80T DS DD | £11.00(d) |

| 3.5" Discs in packs of 10 | |
|---|---|
| 80T SS DD | £13.50(d) |
| 80T DS DD | £15.00(d) |

(Add £1 for library case packing)



All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

## PRINTERS

**EPSON**

| | | | |
|---|---|---|---|
| **LX800** | £179(a) | **LQ500** | £275(a) |
| **FX800** | £309(a) | **LQ850** | £439(a) |
| **FX1000** | £419(a) | **LQ1050** | £599(a) |
| **EX800** | £429(a) | **LQ2550+** | £1049(a) |
| **EX1000** | £579(c) | | |

**GQ3500 Laser Printer £1249(a)**

| | |
|---|---|
| **Taxan KP815** £159(a) **Taxan KP915** | £275(a) |
| **Star LC10** | £175(a) |
| **Star LC10 Colour** | £249(a) |
| **Star LC24-10** | £289(a) |
| **NATIONAL PANASONIC** | |
| **KXP1081*** £145(a) **KXP1082*** | £172(a) |

***(*includes Wysiwyg ROM + Master Lead)***

| | |
|---|---|
| **KXP3131 with 38K buffer** | £245(a) |
| **Canon PW1080A** | £149(a) |
| **Canon Laser LBP8-II** | £1595(a) |
| **Brother HR20 Daisy Wheel** | £349(a) |
| **Juki 6100 Daisy Wheel** | £295(a) |
| **Integrex Colour Inkjet** | £529(a) |

## PLOTTERS

| | |
|---|---|
| **Hitachi 672XD** A3 4 Colour HPGL | £499(a) |
| **Plotmate A4S** | £379(a) |
| **Plotmate A3M** | £549(a) |
| **Roland 880** A3 Flat bed 8 col | £599(a) |

Variety of Plotter pens and accessories in stock.

*Larger Plotters available. Please enquire.*

## EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 × 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A). Introductory price incl. master lead **£275(a)**

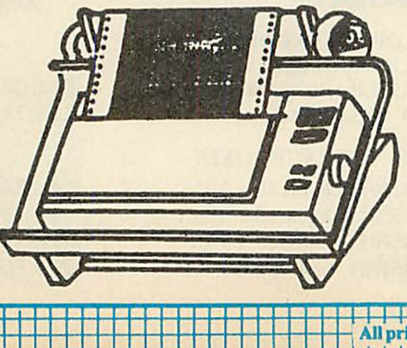
## EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

★ 180cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.
★ 3K input buffer with character downloading facility
★ Fully compatible with BBC & IBM graphics
★ Centronics interface as standard
★ Price including BBC master lead **£179(a)**

## PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



## PRINTER BUFFERS SHARER & CONVERTERS

**TSB 256 Auto Sharer/Buffer**
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies. Full spec on request. **£169(a)**

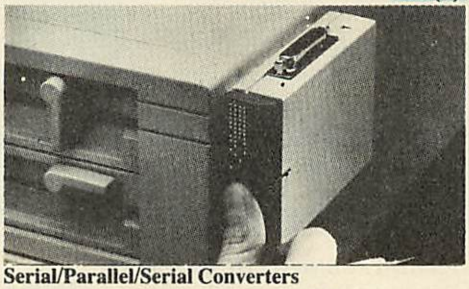
**Smart Printer Buffers**
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port

| | |
|---|---|
| PP256 256K Parallel buffer | £169(b) |
| SS256 256K Serial buffer | £189(b) |

**Parallel Multi-Spoolers**
Allows connecting 2 printers to 2 or 4 computers Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR

| | |
|---|---|
| MS422 4computers/2printers 512K buffer | £299(b) |
| MS223 2computers/2 printers 512K butter | £199(b) |

**Compact Two Way Switch** 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



**Serial/Parallel/Serial Converters**
Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols

| | |
|---|---|
| C-PS Parallel/Serial converter | £35(c) |
| C-SP Serial Parallel converter | £35(c) |

*Add £49 to above prices for units with 64K butter*

**Manual Printer Sharers:**

| (All lines are switched). | Parallel | Serial |
|---|---|---|
| 2 computers to one printer | £25(c) | £25(c) |
| 3 computers to one printer | £39(c) | £39(c) |
| 4 computers to one printer | £45(c) | £45(c) |
| 2 computers to 1 or 2 printers | £49(c) | £49(c) |

***Cable sets for above sharers available for all popular computers***

**BBC Computer Sharer: TCS26**
1 computer to 2 printers fitted with BBC cable £21(c)

**Paper & Labels**
Plain fanfold paper with microperforation:

| | |
|---|---|
| 2000 sheets 9½ × 11″ | £12(£3.50) |
| 2000 sheets 14½ × 11″ | £18.50(£4.50) |
| 1500 sheets A4 90gsm | £18.00(£4.00) |

**Labels/1000**

| | |
|---|---|
| Single Row 3½″ × 1⁷⁄₁₆″ (d) Triple Row 2⁷⁄₁₆″ × ⁷⁄₁₆″ | £5(d) |
| OHP Transparencies A4 (100) | £56(b) |

**PARALLEL PRINTER LEADS**

| | | | |
|---|---|---|---|
| BBC/Master (1.2m) | £5(d) | BBC/Master (2m) | £7(d) |
| Archimedes (2m) | £7(d) | Compact (1.2m) | £7(fd) |

## MODEMS

| | |
|---|---|
| **MIRACLE WS4000 V21/23** | £129(b) |
| **MIRACLE WS3000 V21/23** | £244(b) |
| **MIRACLE WS3000 V22** | £379(b) |
| **MIRACLE WS3000 V22 bis** | £495(b) |
| **Pace Linnet** | £139(b) |
| **(All modems are BABT approved)** | |
| **BBC Data Cable for WS3000/4000** | £10(d) |
| **MIRACLE WS2000V21/23** & BELL stds | £92(c) |

## MONITORS

### 12″, 14″ and 20″ MONITORS

| | |
|---|---|
| **Microvitec 1431** Std Res, 14″ | £179(a) |
| **Microvitec 1431AP** Std Res + PAL/Aud, 14″ | £199(a) |
| **Microvitec 1451** Med Res, 14″ | £225(a) |
| **Microvitec 1451AP** Med Res + PAL/Aud, 14″ | £255(a) |
| **Microvitec 1441** Hi Res, 14″ | £359(a) |

**Philips 8833 14″ RGB**
Med Res, 14″, high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£219(a)**

**Microvitec 2030CS**
20″ Standard Resolution RGB/Comp Video **£380(a)**

**Microvitec 2040CS**
20″ High Resolution RGB/Comp Video **£675(a)**

**TAXAN SUPER VISION 620**
12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**

**TAXAN SUPER VISION 625**
12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**

**TAXAN 770+**
MultiSysnc Autoscan 14″, ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£485(a)**

**NEC MultiSync II 14″**
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£479(a)**

### MONOCHROME MONITORS

**PHILIPS 7752** NEW
14″ green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Inverse video switch, separate brilliance and contrast controls. **£85(a)**

| | |
|---|---|
| **PHILIPS BM 7502** Hi Res green screen | £72(a) |
| **PHILIPS BM 7522** Hi Res amber screen | £79(a) |
| Tilt & Swivel Stand for Philips Mono | £6(c) |

### MONITOR ACCESSORIES

| | |
|---|---|
| Microvitec Swivel Base (14″ plastic monitors) | £17(c) |
| Monitor Stand Models B & B+ | £10(c) |
| Monitor Stand Master | £13(c) |
| Double Tier Stand Models B, B+ or Master | £24(b) |
| Taxan RGB Lead | £7(d) |
| Microvitec Lead | £4(d) |
| Monochrome BNC/Phono Lead | £4(d) |
| Copy Holder Self Supporting A4 | £15(c) |
| New general purpose tilt and swivel stand for 12″ and 14″ Monitors | £15(c) |

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

## CAD/DRAWING PACKAGES

**NOVACAD**
Cad Package for B, B & MASTER.
(See page 5 for specification)

| | |
|---|---|
| Tracker Ball/Mouse Version (TM) | £49 (d) |
| TM Version plus Tracker Ball | £94 (d) |
| TM Version plus Mouse | £79 (d) |
| Plotter Driver Generator | £15 (d) |
| *If purchased with Novacad* | £12 (d) |

**MOUSE**

| | |
|---|---|
| AMX MOUSE with SUPER ART (pse specify B, B+ or Master) | £59 (d) |
| STOP PRESS (Pagemaker) | £32 (d) |
| EXTRA/EXTRA (utility for the Pagemaker) | £19(d) |
| MAX | £17 (d) |
| STAND ALONE MOUSE | £34 (c) |

**RB2 TRACKER BALL**

| | |
|---|---|
| RB2 Tracker Ball with Icon Master (for B, B+ & Master) | £59 (c) |
| RB2 Tracker Ball with Cursor Control Rom (for Master only) | £59 (c) |
| RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software) | £47 (c) |
| Cursor Control Rom for Master | £12.50 (d) |
| MIRRORSOFT FLEET STREET EDITOR | £35 (d) |

## TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program £29(d)

## BBC SOFT/FIRMWARE

### DATABASE MANAGEMENT SYSTEMS

| | |
|---|---|
| VIEWSTORE | £36 (d) |
| STARdataBASE | £39 (d) |
| MASTERFILE II | £17 (d) |
| ACORN OVERVIEW PACKAGE Special Offer (RRP £86) | £69 (b) |
| INTERBASE | £49 (d) |

### WORD PROCESSORS

| | |
|---|---|
| ACORN VIEW PROFESSIONAL (BBC) | £69 (c) |
| VIEW 2.1 | £35 (d) |
| VIEW 3.0 | £45 (c) |
| Double View Rom Version | £42 (d) |
| Double View Disc Version (for Master & Compact) | £33 (d) |
| VIEW INDEX | £12 (d) |
| VIEW PRINTER DRIVER GENERATOR | £8 (d) |
| VIEWSPELL | £29 (d) |
| DOT PRINT PLUS | £28 (d) |
| WORDWISE | £24 (d) |
| WORDWISE PLUS | £38 (d) |
| WYSIWYG PLUS | £21 (d) |
| SPELLMASTER | £42 (d) |
| INTERWORD | £36 (d) |
| WORDEASE | £24 (d) |
| SPELLCHECK III | £31 (d) |
| EDWORD II | £43 (c) |

### SPREADSHEETS

| | |
|---|---|
| VIEWSHEET | £36 (d) |
| WINDOMATIC (A Viewsheet Utility) | £15 (d) |
| VIEWPLOT | £22 (d) |
| INTERSHEET | £37 (d) |
| INTERCHART | £25 (d) |
| ULTRACALC | £26 (d) |
| **MINI OFFICE II DISC Version** | |
| For B & B+ 40T or 80T | £14 (d) |
| For Master 80T | £16 (d) |
| For Compact | £19 (d) |
| **MINI OFFICE II ROM Version** | |
| For Master, Compact, B+ & B | £43 (c) |
| MEGA 3Rom | £76 (b) |

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

### LANGUAGES

| | |
|---|---|
| META ASSEMBLER | £145 (b) |
| TEAM DISASSEMBLER | £145 (b) |
| MACROM | £33 (d) |
| ACORNSOFT 'C' | £40 (c) |
| ACORN MICRO PROLOG | £62 (d) |
| ISO-PASCAL | £51 (c) |
| ISO-PASCAL STAND ALONE GENERATOR | £30 (d) |
| OXFORD PASCAL (40 or 80T) Specify B or B+ | £36 (d) |
| OXFORD PASCAL for Master | £52 (d) |
| ACORN LOGO | £46 (c) |
| LOGOTRON LOGO | £55 (c) |
| BBC PUBLICATIONS OPEN LOGO | £59 (c) |
| ACORN LISP ROM | £39 (d) |
| ACORN FORTH ROM | £39 (d) |
| ACORN COMAL ROM | £39 (d) |
| Advanced BASIC Disc (for B, B+ & Master + 6502 2nd Processor) | £26 (d) |
| MICROTEXT | £52 (c) |
| MICROTEXT PLUS | £229 (b) |

### COMMUNICATIONS

| | |
|---|---|
| TERMULATOR | £25 (d) |
| COMMSTAR II | £28 (d) |
| MAYA Comms Package See next page for details NEW | £49 (d) |
| MODEM MASTER | £11 (d) |
| COMMAND | £34 (d) |
| MASTER TERMULATOR | £34.75 (d) |

### UTILITIES

| | |
|---|---|
| ACORN ADFS ROM | £26 (d) |
| ACORN BASIC EDITOR | £24 (d) |
| MONITOR (BBC Pub) | £19 (d) |
| SLEUTH | £23 (d) |
| TOOLKIT PLUS | £31 (d) |
| TOOLBOX 2 (BBC Pub) Manual | £9.50 (d) |
| Cassette | £9 (d) |
| ACORN GXR GRAPHICS ROM specify B or B+ | £24(d) |
| PRINTMASTER | £24 (d) |
| PRINTWISE | £24 (d) |
| DUMPMASTER | £26 (d) |
| FONTWISE PLUS | £17 (d) |
| ADV TELETEXT UTILITIES ROM | £7.95 (d) |

### COMPACT (all on 3½" disc)

| | |
|---|---|
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A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

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| DEUTSCH DIREKT | Disc/aud/EC£16 (c) |
| | Book£5.95 (d) |
| BLACK QUEEN A long awaited bridge game. (1770DFS) | £13(d) |
| BISMARCK History of the famous battleship. (1770DFS) | £13(d) |

**All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.**



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- Acorn FORTH .......... £7.50
- Acorn LISP .......... £7.50
- Acorn ISO Pascal Ref Manual .......... £10.00
- Intro to COMAL .......... £10.00
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**BBC MICRO GUIDE BOOKS**
- Inside Information .......... £8.95
- Maths Prog in BBC Basic .......... £7.95
- The Friendly Computer Book .......... £4.50
- Toolbox 2 .......... £10.95

**ARCHIMEDES**
- Archimedes Reference Manual .......... £29.95(b)
- ARM Assembly Language Prog .......... £12.95(b)
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**PROGRAMMING/UTILITY**
- Advanced Sideways Ram User Guide .......... £9.95
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- BBC Micro Advance Programming .......... £9.95
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- The Software Business .......... £5.50

**Mastering Operating System (David Atherton) .......... £6.95**

## WYSIWYG PLUS

**WYSIWYG PLUS** is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

**WYSIWYG PLUS** simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

**WYSIWYG PLUS** incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

**WYSIWYG PLUS** is designed to work with the following systems:

| | | |
|---|---|---|
| BBC Model B | 6502 Second Processor, | BBC Master 128 |
| BBC Model B+ | Turbo coprocessor | All printers (Except lasers) |

**WYSIWYG PLUS** workspace is relocatable. **£21(d)**

## MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems. **£49(d)**

## BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

## EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover, Drawstick, Wordplay, Pantry Antics, Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

**5.25" Disc £17.50(d)**
**3.5" Disc £18.50(d)**
**(Normal RRP over £40)**

***See the previous page for comments on compatibility.***

## VU-TYPE

Do you have finger trouble when typing?
Do you letters look like this?

Dear Sor,
I wuold like to...

then you need:

**VU-type,** a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

**Available at a special price of £7.50(d)** instead of the usual £15. Offer valid while stocks last.

## BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

You can play the role of British Navy in its quest to find the Bismarck and sink it or take either British or German role against another player. It requires the highest qualities of judgement, observation and decision to plan strategy and tactics to plot the death of Bismarck. **£13(d)**

## PRINTER ACCESSORIES

**EPSON ACCESSORIES:**
- 8143 RS232 .......... £32 (d)
- 8148 + RS232 + 8k .......... £79 (d)
- IEEE 488 .......... £40 (d)
- Apple II .......... £40 (d)
- Colour option of EX800/1000 .......... £55 (d)

**TRACTOR FEEDERS**
- LQ800 .......... £44 (b)
- LQ1000 .......... £55 (b)
- LQ850 .......... £70 (b)
- LQ1050 .......... £85 (b)
- LQ2500+ .......... £90 (b)
- EX800 .......... £85 (b)
- EX1000 .......... £90(b)

**SHEET FEEDERS:**
- LQ800/850 .......... £159 (b)
- LQ1000/1050 .......... £189 (b)
- EX800/FX800 .......... £159 (b)
- EX1000/LQ2500+ .......... £225 (b)
- FX1000 .......... £189 (b)

Ribbons:
- FX/FX100/100+, FX105 .......... £7 (d)
- RX/FX80, FX85/800 .......... £4 (d)
- LX80/LX800 .......... £4.50 (d)
- LQ800/850 .......... £6 (d)
- LQ1000/1050 .......... £7.75 (d)
- EX800/1000 Black .......... £7.50 (d)
- EX800/1000 Colour .......... £16.80 (d)
- H180 Pen Set (Aqueous/Ball point) .......... £8.25 (d)

**HITACHI 672 Plotter**
- Aqueous Pen Set six pens .......... £18.50 (d)
- Oil Based Pen Set six pens .......... £25.00 (d)

**TAXAN CANON Accessories:**
- Ribbon, KP810/815/910/915 .......... £6 (d)

**Star Printer**
- NL10/LC10 Sheet Feeder .......... £55 (b)
- NL10/LC10 Ribbon .......... £4.50 (b)

**National Panasonic KX P1080/81**
- Spare Ribbon .......... £4.50 (d)
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- KXP3131 Sheet Feeder .......... £189 (a)
- KXP3131 Ribbon .......... £4.50(d)

**JUKI 6100**
- Tractor Feed .......... £149 (a)
- Sheet Feeder .......... £219 (a)
- Ribbon (Carbon) .......... £2.00 (d)

**BROTHER HR20**
- Sheet Feeder .......... £229(a)
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- Spare Ink Cartridge Black .......... £8 (d)
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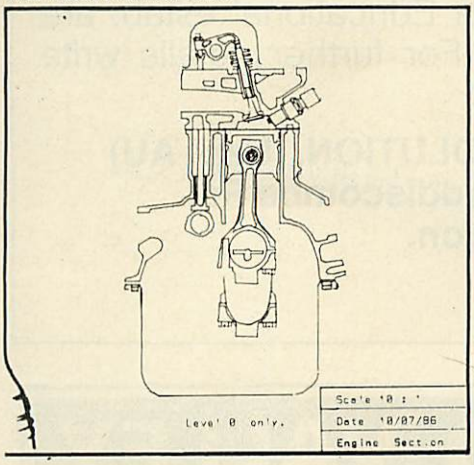
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## NOVACAD Computer Aided Draughting System

*Novacad can drive a plotter to produce drawings of highest quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use.* Beebug Dec 86

A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.




Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

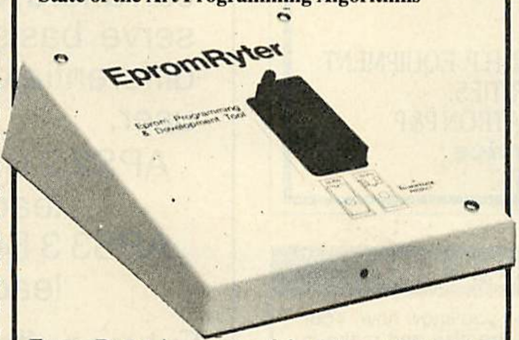
- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
- ★ Text entry at any 90° orientation anywhere on the screen.
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC compatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

| | |
|---|---|
| NOVACAD T/M Version | £49(d) |
| NOVACAD T/M + Plotter DG | £61(c) |
| Plotter Driver Generator | £15(d) |

## EpromRyter

***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**




EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

**The single rail eproms handled by the EpromRyter are:**
- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

**£89(b) + VAT**

## META Ver III ASSEMBLER

*"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach."* Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc – and 68000 – using native mnemonics for each processor, eg LD A, (HL) for Z80 and MOV A0, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassembler.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc – all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF suppression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-bound manual, function-key strip.

**£145(b)**

## EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

## PORTAL EPROM EMULATORS

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- Load at 4Kbytes/second – No "erase" time.
- 28 pin header plugs into Eprom socket on target system – status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-port cable.
- Complete with all cables, manual and disc.

**PORTAL 512** (2716, 2732, 2764, 27128, 27256, 27512). **£245(b)**

## TEAM DISASSEMBLER

The third part of the Universal Development System: a Meta labelling disassembler.

Supports 1802, 8080, 8085, #HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas disassembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/repalce for re-naming arbitrary label names with meaningful ones.

**£145(b)**

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Future buffer updates available!

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## Archilock

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# HINTS & TIPS

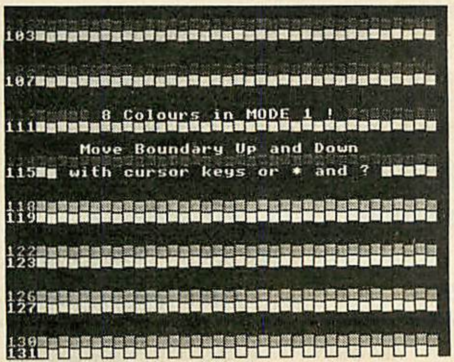
## COLOURFUL EVENTS

**Colours in mode 1, prints of your screen, deleting from ADFS and a numeric keypad for your Electron are just some of our latest ideas**

**David Atherton**

£10

### FLYING COLOURS




**Eight colours in mode 1**

Persuading mode 1 to show eight colours on screen is not a completely new idea, but this program (listing 1) from Iain Coulthard is one of the nicest and most flexible I have seen. More importantly for this column, it can easily be included in your own programs.

Mode 1 uses two bits per pixel to store the screen image, and so it can display a maximum of four colours. However, which four colours are used is determined by the palette in the video ULA chip, which is in turn controlled by the VDU 19 routine. If you are familiar with the way monitors work, you will know that the screen is built up line by line from the top to the bottom. The BBC can work out when this is happening, because every 20 milliseconds, when a new image is starting at the top of the screen, an event called 'frame flyback' occurs. Iain's program starts counting at this point, and after a certain amount of time has passed (set by the program, but easily alterable), the palette chip is reprogrammed, so that a different four colours are used.

The reprogramming is done at a point when the screen is only partially built up, and therefore from that point to the bottom of the screen, the other colours are used. It is possible to reprogram more than once during a screen build-up, but I don't think this is very practical. The original colours are programmed in again when the next screen frame starts, so the net effect is that the top part of the screen contains a given four colours, and the bottom part may contain different colours.

The program demonstrates the effect with rows of coloured boxes, and you can move the point at which the colour changes on screen by moving the up and down arrow keys, or for fine tuning, the '*' and '/' keys. When you press Escape, the effect remains in force, and you can even start up applications like *View* without losing it.

£10

### LOWER CASE BASIC

Another offering from Iain Coulthard is a solution to the problem posed by J Ault on the Letters page of the October 1988 issue. Mr Ault keeps forgetting to hold down the Shift key when typing in Basic keywords which, as you know, must be in upper case. The program (listing 2) supplied by Iain is a nifty little routine which resides in memory, at the usual page &9 address, and intercepts all input. Any Basic keywords typed in lower case are converted to upper case, and correctly tokenised, but ingeniously, other input is not, so if you type 'for i=1 to 5', the 'for' and 'to' will be converted, but the variable 'i' will remain in lower case. Also, any direct commands such as 'list' and 'run' can be typed in lower case and will work correctly. The only slight problem is if you wanted to use a lower case variable which had the same name as a Basic keyword, ie, 'list=2'. The program will catch the 'list' and tokenise it, causing an error.

To use the program, type in the listing, and save it. Then CHAIN the source code, and a machine code file called Nocase will be generated. This should be *RUN in the usual way before typing in a program. The program installs itself the first time it is run. To deinstall it, press Break.

The program works because Basic has no actual editor or line entry system of its own, and relies on Osword 0, the standard line input command, to accept program lines. Iain's program intercepts Osword 0, and turns the whole line into upper case. The Basic tokenise routine is then called, in the Basic ROM (messy, but there isn't any other way to do it), and the line is tokenised. To do this, Iain has to deal directly with the zero page Basic variables. The line is then processed further – anything which is a token is ignored, and other text is returned to its original state.

To save space, the initialisation routine is stored in the same place as the line buffer, which means that when the initialisation code is complete, the bytes are then corrupted by the first input. The only consequence of this, which is generally a useful technique when memory is tight, is that *SAVEing the code after use, or after Break, or trying to reinstall the code with CALL rather than a *RUN, will not work.

Note that the routine contains the addresses of the tokenise routines for Basic I and II respectively at the label 'tokaddr', plus the addresses of the Basic keyword and token tables at 'tabaddr'. If you want to use the program with other versions of Basic, (for example if you have a Master) then the appropriate addresses will need to be substituted, and the code changed slightly to recognise the Basic ROMs in the Master and Compact (which are not the same, by the way). The keyword table address is &8456 in Basic 4 on a Master 128, and &842F in Basic &40 on a Compact. I have not, however, been able to discover the addresses of the tokenising routines in these two versions. Perhaps a reader could enlighten me?

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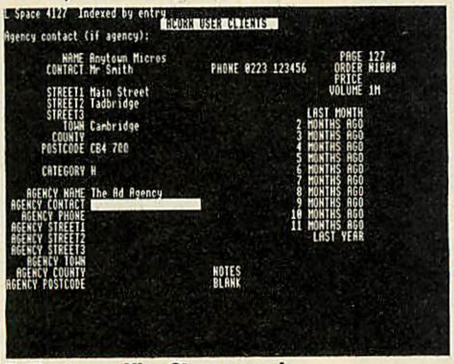
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# HINTS & TIPS

## PRINTING BLACK AND WHITE

We have had a good response to the PrtSc utility, the text screen dump published in the August 1988 Hints and Tips. Many readers found it useful for quick prints of the current screen, especially when using packages like *ViewStore*. If you've got a Master (see the letter in the November issue from R Duncan). It allows you to obtain one or two records, without having to generate a complete report.

One of the drawbacks of the original listing was that anything shown in inverse video on the screen was not printed, but simply replaced by spaces. This is because the routine used Osbyte 135 to recognise the Ascii values of each character on screen, and a reversed character is not




**PrtSc dumps ViewStore records**

recognised by this routine. However, if the current text screen colours are reversed first, the routine does recognise these characters, so I have written some extra lines for the program which cope with this (listing 3 on the yellow pages).

The extra code is inserted after the text, and is only used if no match is found. A call is made to the routine 'rvstest' which selects COLOUR 0: COLOUR 135, ie, black text on a white background, and a second attempt to read the character is made. The text colours are then set back to the normal white on black with the machine code equivalent of COLOUR 7: COLOUR 128. I have used colour 7, as this is white in all screen modes. This is a useful tip anyway for multi-mode programs – rather than selecting COLOUR 1 in a two-colour mode, and COLOUR 3 in four colours, you will find that COLOUR 7 (and COLOUR 135 for backgrounds) works correctly in all modes.

If no match is found with the reversed colour, the space character is still output. The net effect is that all characters on the screen in white on black, or black on white are printed. The routine still doesn't cope with other colours – perhaps that is something you would like to try yourself.

To use the revised program, load the original in as you typed it, or from the monthly disc, being careful not to renumber the program. Then type in the extra lines listed using the line numbers given. All are new lines except line 1820, which replaces the existing line as, obviously a new checksum is needed. Then save your revised version, and RUN it. The procedure is then identical to the original.

When the program was originally published, I mentioned a couple of ways that you might try to improve it. An interesting point that has arisen is that if you look at the special characters used by your printer for the Ascii codes 128 to 255, and emulate these on screen by normal character redefinition, and use such codes for graphics and symbols in your program, then you will find that the printer correctly displays these when used with PrtSc. In particular, you could define characters to be the same as the IBM graphic characters used by many printers: there's a file on the monthly disc to do this for Master series micros. You *EXEC the file, and this redefines all the characters using VDU 23 codes.

## £5 EDIT TIP

Simon Reeves from Harrow has a tip concerning EDIT, the built-in text editor on the Master 128. From Basic, you can type a number of parameters, such as EDIT 10,100 which only edits lines at that range, or EDIT IF PRINT, which only transfers those lines containing PRINT. The problem with this particular method is that when you return to Basic using Shift-f4, all the other lines of the program are deleted: only those lines you selected for editing (and any you added in the editor) are copied back. This is a pity, as the selective edit – especially the IF variation can be very useful.

Simon points out that you can use the feature as long as you don't use Shift-f4. Instead, use f3 to save the file as text, then enter Basic with f1 then *BASIC, reload the Basic program from disc, and *EXEC the text file in 'on top' of it. As long as you keep the same line numbers, and any new lines you create have new numbers, everything will be alright.

## ADFS WIPE

Several people have pointed out to me that the one DFS command missing from ADFS is *WIPE, which steps through a list of files, offering a Y/N prompt, allowing you to choose which to delete, and which to keep. I have, therefore, written a small program in Basic to perform this function (listing 4 on the yellow pages). The program prompts you for a file specification which will determine which files are displayed, just like the DFS version. You can either enter a single filename, which will offer one file for wiping, an ambiguous name such as PR*, which offers all files starting with PR, or just pressing Return will display the entire directory.

Each filename is displayed in turn, and the program waits for you to press Y or N – any other key is ignored. If you press Y, the file is deleted. When all the files in that directory which match the specification you have given have been displayed the program stops, and reports how many files it has deleted.

The program works by using the Osgbpb call, with A=8 to read the filenames in the current directory, and this is the main reason for writing it. Ospbpb 8 is an extremely useful routine for anyone wishing to write a menu program, or a program which offers you a list of data files rather than having to work out which files they want from *CAT.

The call works like most filing system OS calls by using a data block in memory, having the X and Y registers point to that block, ie, X is set to the low byte of the block address, Y to the high byte. The data block for the Osgbpb group of calls is 13 bytes long, and for call 8 (the call with A equal to 8), the values required are:

- Byte 0 – 0
- Bytes 1 – 4 Memory address for filenames
- Bytes 5 – 8 Number of filenames required
- Bytes 9 – 12 Pointer to next filename. Set this to zero, the first time you request a filename, but do not alter it when you call the routine again.

It is possible to read in all filenames on disc at once, but there is no easy legal way of finding out how many files there are. I find that it is much better to call the routine for one filename at a time, as long as you can

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keep bytes four to 12 of the parameter block safe from corruption. This is what happens in the function 'FNnextfile' in the Wipe program. B% contains the address of the first byte of the Osgbpb parameter block, while D% is another reserved area of memory in which to store the filename text. The X and Y registers are set, and the code is called.

I have used USR rather than CALL, because, after repeated use, the way that the call tells you there are no more filenames is to set the carry flag. Don't be confused by the way I have handled this in the program. It just uses a four byte memory block at R% to store the four registers, and then reads the carry flag, which is the least significant bit of the most significant byte returned by USR. It means that if you return the registers of call with !‹address›=USR call, then ‹address›?3 AND 1 will be equal to the carry flag setting. This is a technique which is much neater than the more common method of ADDing and DIViding using very large numbers.

The function tests the carry flag and sets the filename to an empty string if carry is set. This is because when this condition is reached, the previous filename is still in the memory block. Osgbpb doesn't remove it. Dealing with a null string rather than a separate flag reduces the number of variables the main program has to handle.

The format of the filename as returned is a name length byte, followed by the text of the name. There is no carriage return on the string, so I have poked one in at the end of the filename, using the length byte to calculate where to put it. Note that all filing systems return a filename length equal to the maximum that filing system can use. So for ADFS, the length will always be given as 10 bytes, and the filename itself is padded out with spaces. If you are writing a menu or file selection program, this is no bad thing, as it makes screen formatting easier, and of course, if the string is used again to load or open the file, the padding spaces do no harm.

The Osgbpb 8 function works for all filing systems, so programs which use it can read files from any system. Note that only files in the current directory (even in DFS) are returned, so multiple calls after resetting the current directory may be necessary. If you do change directory, you should also reset bytes 9 to 12 to zero. On some versions of the network filing system, the carry flag is not set at the end of the list, but instead a zero is written to the length byte, ie, the address pointed to by Bytes 1 to 4. For completeness you might like to test this as well.

If you want to put the filenames into a string array, you can either set the array for the maximum files per directory for that filing system (31 for DFS, 47 for ADFS, 239 for NFS), or read through the filenames once just to see how many there are, dimension the array, then go back and read them again into the array. Another way you could do it would be to set a large memory block and ask to read the maximum number to start off with, but the coding is more fiddly doing in that way.

£10

## NUMERIC KEYPAD FOR ELECTRON

Do you enter a lot of figures on your Electron? Wouldn't it be nice to have a numeric keypad, just like Master owners. This short utility (listing 5), also from Iain Coulthard, which is compatible with *ViewSheet*, gives you that facility. It remaps a section of the ordinary keyboard. When you have typed in the listing and run it, a machine code file called Keypad will be produced, and you can save it to tape or disc. Afterwards, typing *KEYPAD (or *UN KEYPAD from tape), will set up the keyboard as follows:

U = 4   I = 5   O = 6
J = 1   K = 2   L = 3
M = 0

There is no remapping needed for 7, 8 and 9, as these are directly above the U, I and O keys. Obviously you will need to use the keys in normal mode as well, so Iain has included a switch. This is activated by CTRL-0. The program starts generating ordinary letters. Press CTRL-0 to start numeric output, and press CTRL-0 again to switch it off.


**Redefine the Elk keys**

The program works by intercepting the RDCHV vector, which deals with keyboard input using Osrdch (or GET and INPUT in Basic). It does not deal with the direct keyswitching method, so the new characters would not work with programs which use that method of key detection. A data table in the program lists the characters involved, and the characters to which they are translated. It wouldn't be difficult to alter this to change the identity of other keys – for example if you are disabled, you could make a control sequence (such as CTRL-P) or even just a difficult shifted character such as &, which is available from a single keypress.

The routine uses page &9 in memory, which means that it won't work if you are writing data to cassette using BPUT#, or using the RS423 system.

Also there may be a clash with some utility programs which use the same area. The program also works perfectly with a Model B or Master. You should press CTRL-@ rather than CTRL-0. Of course it is rather superfluous on the Master and Compact as it stands, but may be useful if you modify it.

## QUINN'S QUICKIES

In *View*, you can use special character in Search, Change and Replace commands. For example, to separate any paragraphs indented with Tabs with extra blank lines, try:

CHANGE ∧C∧T#∧C∧C

∧C stands for a carriage return, ∧T for a Tab. ∧S can be used to mean a space, and it is even possible to search for highlights, ∧* and ∧-. The ∧ character itself can be specified with ∧∧.

■ If you don't have a printer connected to your machine, you can use *FX5, 0 to prevent any software which expects a printer from 'hanging'. The FX command means that any text which is sent to the printer is ignored.

*All submissions – hints, tips, programs or simply ideas – should be sent to Hints and Tips,* Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

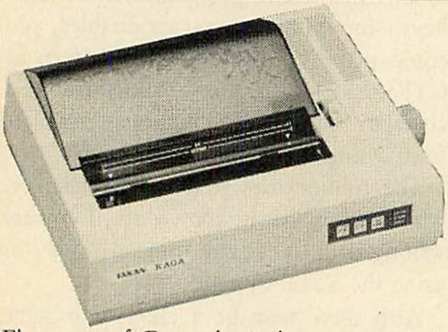
# ARC AGORA

## GOING DOTTY

**Curing a dotty bug of Arthur's, the low-down on loaders and a Quicksort in ARM are the topics this issue**

***Dave Acton***

### £10
### TOP-BIT TROUBLES



First out of December's bag comes J A Briant's fix for a nasty feature of *MEMORYI. Those of you that have used the command to disassemble pieces of code may well have noticed that 'top-bit-set characters' (you know, those squiggles with Ascii values greater than 127 that nobody really uses anyway) are displayed as themselves and not converted to full-stops, as are characters 0 to 31 for example.

This usually isn't too much of a problem, although it is not particularly helpful to know what the opcode for LDM (sp)!,{R0} spells in the Norwegian character set. The problem occurs when trying to print out the output of *MEMORYI – Mr Briant's printer decides to switch to proportional condensed Elite type, and so he produced a cure, presented as listing 1 on the yellow pages. For this Mr Briant receives the goodly sum of £10.

His program assembles a relocatable module which is saved as 'PfixMod' and then *RMLOADed again. Typing *MODULES should present a list with 'PrinterFix' at the bottom. If it does, you can try out the two commands it supports – *STRIP and *PFIX.

The more general command supplied is *STRIP which may be followed with ON or OFF. *STRIP ON intercepts that VDU stream and converts any passing top-bit-set characters into full stops. *STRIP OFF turns the facility off again. Following with 'P' will enable output to the printer.

A more specific command is also included – *PFIX. Rather than intercepting the VDU stream indefinitely, this command merely does so for the command that follows. In other words, to convert top-bit-set characters to dots and send output to the printer, merely precede your star command with *PFIX, for example:

*PFIX MemoryI 20000 +1000

All should be well: your printer should not select some strange character set or typeface, and once the dump is complete normal service should be resumed.

Listing 1 should be fairly easy to follow. The module header is standard and will be familiar to regular readers. The code to deal with *STRIP begins at .stripcode and that for *PFIX is at .fixcode.

After decoding the parameters following the star commands, the VDU vector is claimed or released as necessary by .fclaim and .frelease respectively. The SWI call "OS_Claim" is used to claim the vector and takes three parameters: the vector number in R0 (3 to specify Write CV), the address of the routine being 'added to the chain' in R1 and a value in R2 which is to be passed to the routine. It's passed to the routine in R12, but it isn't used in listing 1.

The VDU vector is released by a call to "OS_Release", and Mr Briant uses the 'X' form to avoid errors such as 'Bad vector release'. All-in-all a nice, simple solution to a very annoying feature of Arthur 1.2.

```
 *STRIP OFF
>*MEMORYI 03870A00 +10
03870A00 : \8 Í : E59F385C : LDR      R3,[PC,#2140]
03870A04 : .` ð : E49C6000 : LDR      R6,[R12],#0
03870A08 : .` Á : E0866003 : ADD      R6,R6,R3
03870A0C : .. ð : E4960004 : LDR      R0,[R6],#4
>*STRIP ON
>*MEMORYI 03870A00 +10
03870A00 : \8.. : E59F385C : LDR      R3,[PC,#2140]
03870A04 : .`.. : E49C6000 : LDR      R6,[R12],#0
03870A08 : .`.. : E0866003 : ADD      R6,R6,R3
03870A0C : .... : E4960004 : LDR      R0,[R6],#4
>
```

**STRIP filters out the foreign characters seen in the second column**

### £15
### LOADER RUBBISH!

How do I put this? The loader included in October's podule example was . . . well, completely useless. Sorry. Andy Armstrong of Allied Interactive Ltd pointed out the error of my SWIs, and sent me an example of how it should be done. Andy is the lucky winner of the £15 look-who-got-it-wrong prize.

As you may recall, a variety of data may be stored in a podule ROM, each with an entry in the 'chunk directory'. One possible variety of data is the 'loader' which is used by the podule manager to read from and write to the podule. You may recall that each podule is only allocated 4k of space within the main memory map, so larger areas of podule memory must be 'paged in' as appropriate.

Now, in the example given last month, the loader was entirely redundant. The first page of a podule ROM (ie, the first 1k or 2k lump – depending on how your ROM is paged) is read by the podule manager using its own 'default' loader. If during the process of looking through this first page,

the podule manager stumbles upon a loader of your own, it copies it down into RAM and then uses it to look for *another* chunk directory. This second chunk directory must be at the start of what is called the 'code space' which can live wherever you want but generally sits immediately after all the bits and pieces included in the first chunk directory.

As Andy points out, your loader is supplied with addresses from 0 upwards and these refer to the *code space*. Thus, they must be offset into your podule ROM appropriately. To do this just add the position of the code space relative to the start of the ROM.

The reason my faulty example may seem to work is that by neglecting to offset the addresses supplied to the loader by the appropriate amount, the podule manager was in fact reading the start of my podule ROM and expecting to find the second chunk directory there. Finding a block of zeros, it probably decided that there was no second directory at all.

Andy's correct example is given in listing 2 on the yellow pages. I recommend that you dust off your October issue and have a look at the wrong original as well.

The first chunk directory is built up in the usual way. Andy, like me, uses functions to simplify things and includes three items in his first directory: the loader, a date of manufacture and a podule description. Andy's functions take as their last parameter a flag which can be TRUE or FALSE. When FALSE, the location of the directory entry is calculated as an offset from the beginning of the ROM (used for entries in the first directory); when TRUE it is worked out as an offset from the beginning of the code space (used for the second directory).

The loader begins with the four statutory branches – only reading is permitted in this case. Reading begins at .readabyte and you'll notice the first thing done is to add the necessary offset to the address in R1 to point into the code space.

Andy's example expects there to be a paging register at podule location &2000 (that is, halfway into the podule area). Remember that real addresses go up in steps of four within the podule space so consecutive bytes are at 0,4,8 and so on. The paging register is set with the appropriate page number (R1 DIV &800), and the remainder (R1 MOD &800) is multiplied by four and used to extract the particular byte from the page selected. Before returning, the loader restores register R1 and clears the overflow flag – as all the best subroutines do.

Those of you with Atomwide Podule Expansion Cards (cards with basic podule hardware plus a blank board area for your own circuits) who want to use paging register facilities should refer to your manuals for more details, but the code described therein will probably be very similar to that in listing 2.

To show that everything actually works, listing 2 imports the module created by listing 1 (the nearest module to hand) and includes it in the second chunk directory. Obviously you may import your own and you should adjust the value of 'codesize' depending on the size of podule ROM being used.

Because the 'PrinterFix' module is short enough to fit in the first page of the ROM you will be able to use the podule image without a paging register.

To simulate the mistake of last month simply remove the addition (and subtraction) of the offset (codespace-modulebase), blow the resulting image into your podule and press CTRL-Break. The module 'PrinterFix' will not appear in *MODULES as the podule manager is unable to find the second chunk directory.

## £10 A GOOD SORT

For all you integer speed-freaks out there, here's an implementation for the Archimedes of the famous Quicksort algorithm to keep you happy. It comes from one of our Continental readers – Ferdinand Oeinck of The Netherlands.

Those who are interested in how Quicksort works are advised to consult a suitable textbook, or Nick Wetherby's article in the November 1987 *Acorn User*.

This quicksort is in ARM machine code. It is assembled by PROCass, and the routine is called with A% containing the address of the start of the integer store, B% containing 1 and C% containing the number of integers to sort. 10,000 randomly chosen integers can be sorted in about 0.75 seconds, which is pretty good going, all things considered.

Once sorted, the numbers are listed so that you can see that it isn't cheating.

£10 goes to Ferdinand for his contribution and, while I have the opportunity, best wishes go to all our European friends for helping this column maintain its cosmopolitan flavour!

## PICK UP A PALETTE

Last month Agora included a procedure to load palette files; you can create these with the desktop by editing the colours then saving the palette. But it is also easy to build a routine to save the palette into your own programs:

```
 1000 DEF PROCsavepal (f
ile$)
 1010 LOCAL file%,col%
 1020 file%=OPENOUTfile$
 1030 FOR col%=0 TO 15
 1040 PROCwritecol (col%
,16,file%)
 1050 NEXT
 1060 PROCwritecol (0,24
,file%)
 1070 FOR col%=1 TO 3
 1080 PROCwritecol (col%
,25,file%)
 1090 NEXT
 1100 CLOSE# file%
 1110 OSCLI "SETTYPE "+f
ile$+" FED"
 1120 ENDPROC
 1130 :
 1140 DEF PROCwritecol (
col1%,col2%,file%)
 1150 LOCAL rgb%
 1160 SYS "OS_ReadPalett
e",col1%,col2% TO,,rgb%
 1170 BPUT# file%, &FF A
ND (rgb% >> 8)
 1180 BPUT# file%, &FF A
ND (rgb% >> 16)
 1190 BPUT# file%, &FF A
ND (rgb% >> 24)
 1200 ENDPROC
```

This will save the palette in the same form as the desktop, and is suitable for reloading with last month's routine. Line 1080 of the program should have read:

```
 1080 MOUSE COLOUR col%,
BGET# file%,BGET# file%
,BGET# file%
```

## FAREWELL ARTHUR

In April 1989 the new Arc operating system will become available. RISC OS will replace your Arthur 1.2 ROMs with four new chips.

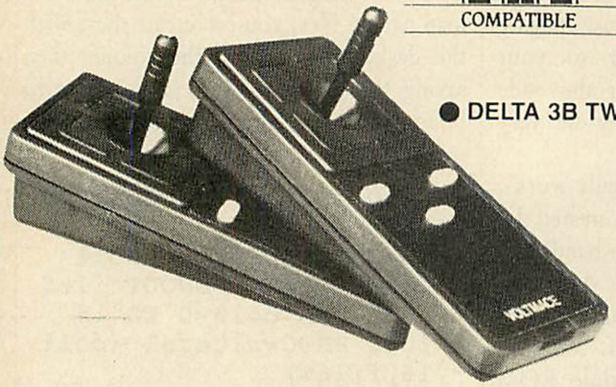
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All contributions are very welcome and should be sent to Arc Agora, *Acorn User*, 20-26 Brunswick Place, London N1 6DJ.

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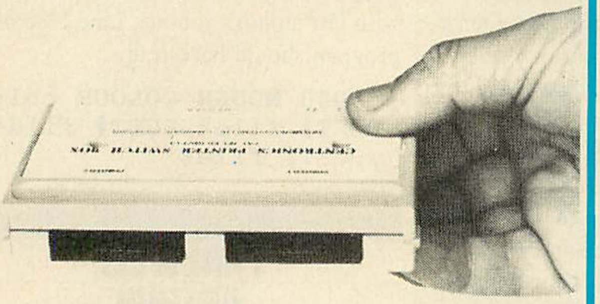
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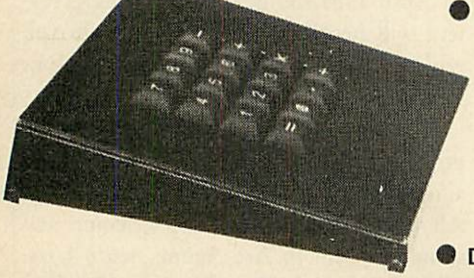
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| Archie Spell Master | £49 | | |

### DATABASES

| | | | |
|---|---|---|---|
| AlphaBase | £39 | Viewstore | £49 |
| System's Delta Plus | | | £60 |

### SPREADSHEETS

| | | | |
|---|---|---|---|
| Intersheet ROM | £35 | Viewsheet | £49 |

### BUSINESS GRAPHICS

| | | | |
|---|---|---|---|
| GammaPlot | £30 | Interchart ROM | £22 |

### INTEGRATED PACKAGES

**Logistix** – Database, Spreadsheet, Time Management & Business Graphics £95

### PC EMULATION Pack

(for 310, 410 & 440), including MSDOS 3.21 £79

### GRAPHICS, ART & DESIGN

| | | | |
|---|---|---|---|
| Interchart | £25 | Gamma Plot | £30 |
| Artisan | £31 | Gamma Plus | £60 |
| Support Disc | £17 | **Autosketch** | £69 |
| Toolkit (Beebug) | £32 | Toolkit (Clares) | £31 |
| Arc Termulator | £59 | Zarch | £16 |

### LANGUAGES

| | |
|---|---|
| ANSI 'C'; ISO-PASCAL; FORTRAN 77; | £95 each |
| Cambridge LISP; PROLOG X | £181 each |
| Archimedes Assembler | £189 |
| TWIN EDITOR | £27 |

### 0% (APR) FINANCE

*For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at **0% (APR)** finance. Credit facility available subject to status. Please inquire for further details.*
*(Watford Electronics are Licenced Credit Brokers)*

### Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

**Only £25**

### Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. NO SOLDERING is involved. Supplied complete with necessary lead.

**Only £19**

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

New

**By Popular demand we are now supplying refurbished and fully guaranteed BBC Micro Model B with Disc Filing System**

(Please telephone for price & availability)

NEW

**Archimedes On-site Maintenance now available**

(Please write in for further details)

### The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

New low price **£175**

CREDIT TERMS now available. Please telephone or write in for further information.

## BBC MASTER

**MASTER** 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £125 worth of FREE OFFER (see below) **£379**

### SPECIAL OFFER

**FREE . . . £105 worth of Hardware & Software**

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** 3½", double sided 1 Megabyte (unformated) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

***BBC MASTER with Turbo Board + above SPECIAL OFFER*** ***£513***

*512K Processor Add on Board "inc. Mouse and GEM package"* ***£95***

***BBC MASTER plus 512K 80186 Co-processor Board (incl. Mouse and GEM package) plus the above £105 worth of SPECIAL OFFER*** ***£449***

### ADD-ONs & ACCESSORIES

| | |
|---|---|
| Turbo 65C102 Add-on Module | £116 |
| Econet Module for the Master | £40 |
| Twin ROM Cartridge for Master | £7.50 |
| Quad ROM Cartridge for Master | £11 |
| Universal Processor Adaptor | £75 |
| Master Reference Manual I | (No VAT) £14 |
| Master Reference Manual II | (No VAT) £14 |
| Master Advance Ref. Manual | (No VAT) £19 |
| 64K Upgrade Kit for B+ | £32 |
| Acorn 1770 DFS Kit complete | £49 |
| ECONET Upgrade Kit for BBC | £42 |
| ALL ECONET UPGRADES Available | |
| ARIES' Professional IEEE Interface | £238 |
| Acorn IEEE Interface Complete | £265 |
| Morley Teletext Adaptor with ATS Rom | £99 |

### BBC MASTER COMPACT

| | | |
|---|---|---|
| System 1 | Standard Package | £299 |
| System 1A | System 1 + TV Modulator | £315 |
| System 2 | System 1 + Green Hires Monitor | £345 |
| System 3 | System 1 + Medium Res Colour Monitor | £469 |
| RS232 Kit for BBC Compact | | £25 |
| Additional 3½" Drive for BBC Compact | | £90 |

(Securicor carriage £7)

### 65C102 2nd PROCESSOR

**(65C102 replaces the original Acorn 6502 2nd Processor)**

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

**£159**

# Z88 Sinclair's Portable Micro



The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: **£239**

**FREE**

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

## ACCESSORIES

| | |
|---|---|
| Mains Adaptor | £8.65 |
| 32K RAM Pack or 32K EPROM Pack | £17.35 |
| 128K RAM Pack or 128K EPROM Pack | £43.40 |
| 512K RAM Pack | £169 |
| Z88 Spellmaster for Pipedream | £51 |
| Z88 to BBC Link | £21.70 |
| Z88 to PC Link II | £30 |
| Z88 EPROM ERASER | £34.75 |
| Serial Printer Cable | £8.65 |
| Parallel Printer Cable | £24.00 |
| Z88 Modem | £145 |
| Z88 Soft Carrying Case | £8.50 |
| Sinclair Z88 Computing Book | £9.95 |
| AA Nicad Rechargeable Battery | £1.50 |
| Battery Charger, Compact & Fast (3 Hours) | £6 |

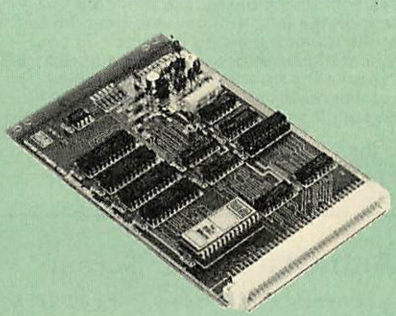
# CO-PRO Adaptor




Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro to add a second Co-processor externally.
Watford, brings power to your BBC at only:

**£35** (carr £5)

# Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

## SPECIFICATION

**SOFTWARE**

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

**UTILITY DISK**

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

**RESOLUTION**

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied). **Cont.**

**SPEED**

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

**HARDWARE**

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

**Price £249**

**Watford Electronics are Appointed & Authorised DEALERS / REPAIR CENTRE for Acorn Computers Ltd Microvitec Monitors Panasonic Printers**

# Watford Dealers' List

## UNITED KINGDOM

Alpha Microtec Ltd, 321 Stratford Road, Shirley, Solihull, West Midlands. Tel: 021-745 8998.

Badger Micros (Devon), Badger's Hill, Southerton, Ottery-St. Mary, Devon EX11 1SE. Tel: 0395 68516.

Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing, West Sussex. Tel: 0903 213361.

HCCS, 575-583 Durham Road, Low Fell, Gateshead, Nr. Newcastle Upon Tyne. Tel. 091 4870760.

Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

Microman Computers, Pasture Lane Farm, Pasture Lane, Rainford, St. Helens, Merseyside WA11 8PU. Tel: 074488 3667.

The Computer Depot, 205 Buchanan Street, Glasgow G1 2JZ. Tel: 041-332 3944.

Verospeed Ltd, Boyatt Wood, Eastleigh, Hants.

## OVERSEAS DEALERS

*Absolute Electronics, Rewal House, 208-210 La Trobe Street, Melbourne, 3000, Victoria, Australia. Tel: (03) 663 2411.

Alpha Computer Co, Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong, Tel: 5-506592.

Computer Distribution Company, Parklaan, 47, 8-9300 Aaist, Belgium.

E.B.N., Elisenstrasse 13, 1000 Berlin 41. Tel: (030) 7952057.

Lendac Data Systems, Unit 31, IDA Enterprise Centre, Pearce Street, Dublin 12. Tel: 710796.

Lindis International Ltd, Wood Farm, Linstead Magna, Halesworth, Suffolk. Tel: 098 685 476.

Scientex P.V.B.A., Zilversmidstraat 2, B-2000 Antwerpen, Belgium, Tel: 03 233 59 06.

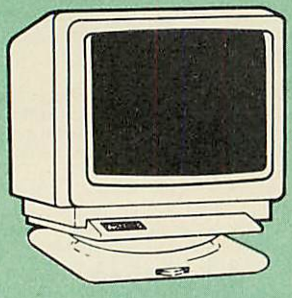
Techno-matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark.

*Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland, Tel: (010) 413 8197/414 5171.

Viking Tecno, Vestergade 12.1, 9620 Aalestrup, Denmark, Tel: 08 642522.
*Acorn/Watford Referral Centres.

Continued →

# MONITORS & SWIVEL BASES



**All Monitors are supplied complete with BBC connecting leads FREE.**

## MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£219**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

## TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£479**

- **NEC JC-1402P 14"** Multisync II Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£475**

## PHILLIPS

- BM7502 12" Hi-res Green Monitor **£65**
- CM8833 14" Med. Res Colour Monitor **£219**

## STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

**ONLY £195**

Dust Cover for Phillips Monitors **£6**

NEW

## SPECIAL OFFER AMBER MONITOR

BT MERLIN/Acorn 12" Hi resolution Amber monitor. Ideal for wordprocessing. Consealed front panel mounted controls. Illuminated mains on/off rocker switch. Supplied complete with BBC Cable.

**Only £49**
(Offer valid while stocks last)

**N.B.** carriage on Monitors **£7** (securicor)

A range of IBM PC Compatible monitors, both monochrome & Colour are now available. Please write in for our descriptive PC brochure.

### SPARE LEADS

| | |
|---|---|
| **BNC Lead for Zenith or Philips** | **£3** |
| Skart Monitor Lead | **£5** |
| RGB lead for TAXAN Monitors | **£3** |
| Archimedes Colour Monitor Lead | **£7.50** |

By placing your monitor on one of our professional swivel bases (see monitors drawing on the left), you gain the freedom to adjust the monitor viewing angle to suit your needs and thus alleviate eye strain and reduce back stress. The front mounted adjustable control dial makes adjusting the monitor viewing angle very simple.

for 12" Monitors **£7** (carr. £2.50)
for 14" Monitors **£10** (carr. £2.50)

## Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

**£12**

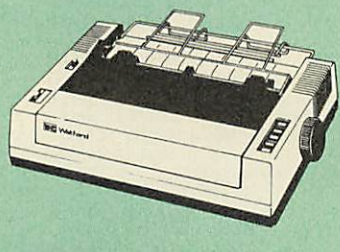
## TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

**Offer Price £155**

| | |
|---|---|
| Taxan KP915 132 Column Printerr (carr £7) | **£275** |
| RS232 Interface | **£49** |
| RS232 Interface with 2K Buffer | **£69** |
| RS232 Interface with 16K Buffer | **£89** |

# Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

***(Price inlcudes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).***

Special Price: **£145** (carr. £6)
Optional RS232 Interface: **£39**

## Panasonic KX-P3131 Daisy-Wheel Printer

Low-cost, high performance; Bi-directional, Logic seeking, Proportional spacing, 10, 12 & 15 CPI, Speed 17CPS. 6K Buffer.

Only **£255** (carr. £7)

| | |
|---|---|
| Tractor Feed | **£90** |
| Daisy Wheel (various) | **£12** |
| Ribbons: Standard **£4.50**; Long Life **£7** | |
| Extra 32K Printer Buffer (internally fitted) | **£13** |

## RS-232 GENDER CHANGERS

| | |
|---|---|
| Male to Female | **£6.95** |
| Female to Male | **£6.95** |
| Male to Female | **£6.95** |

## Panasonic KX-P4450 LASER PRINTER

Latest technology at affordable price. Prints 11 pages a minute, Two A4 size paper bins, Serial & Parallel ports, 512K Buffer – expandable to 1.5Meg, 15 Character LCD Display, Diablo 630, Epson FX-286, IBM Proprinter, HP Laserjet emulations, 5K pages per month duty cycle.

**ONLY £1,469**
Toner for KX-P4450 **£29**

## NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

**Price: £269**

FREE Price includes a Free BBC Cable.

| | |
|---|---|
| Cut Sheet Feeder | **£59** |
| Pinwriter Serial Interface | **£55** |
| Additional Font Cartridge | **£25** |
| NEC P2200 Pinwriter Ribbon | **£6** |

## NEC PINWRITER P6/P7 Plus

**The Ultimate matrix Printer for Business.**

**24pin printhead; Print speed, 265cps Draft, 90cps LQ; Inbuilt Tractor & Friction feed; A paper park & low tear facility; 20 inbuilt FONTs; A font cartridge facility; 8K of printer buffer; colour option available.**

| | |
|---|---|
| **P6 Plus 80 columns** | **£439** |
| P7 Plus 136 columns | **£575** |
| Cut Sheet Feeder | **£125** |
| Colour Option | **£74** |
| Serial Interface | **£73** |

## EPSON PRINTERS

| | | | |
|---|---|---|---|
| EX800 | **£405** | LQ850 | **£469** |
| EX1000 | **£545** | LQ1050 | **£585** |
| FX850 | **£315** | LQ2550 | **£899** |
| FX1000 | **£425** | LX800 | **£175** |
| GQ3500 Laser | **£1249** | SQ2500 | **£975** |
| LQ500 | **£285** | | |
| **Star LC10** | **£185** | **LC10 Colour** | **£229** |

### PLOTTERS

| | |
|---|---|
| Hitachi 672 Colour Plotter | **£475** |
| Plotmate Plotter A4S | **£379** |
| Plotmate Plotter A3M | **£549** |

### CUT SHEET FEEDERS for

EX800 **£149**; EX1000/LQ2550 **£210**; FX800 **£149**; FX1000 **£179**; LQ/LX800 **£139**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175**.

### TRACTOR FEED for

EX800/1000 **£85**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£85**; LQ2500 **£195**

### ACCESSORIES

- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- LQ2500 Colour Option **£65**

**(Securicor Carriage on Printers £7**

## EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

| | | | |
|---|---|---|---|
| RS232 | **£32** | RS232 + 2K Buffer | **£52** |
| IEEE 488 | **£40** | RS232 + 8K Buffer | **£79** |

## Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables. **(Ideal for School environments.)**

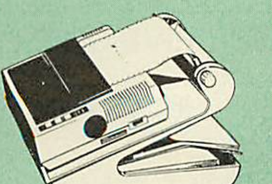
| **Connects** | **Serial** | **Centronics** |
|---|---|---|
| 2 to 1 | £22 | £23 |
| 3 to 1 | £30 | £32 |
| 5 to 1 | £40 | £42 |

(Cables extra at £6 each. Please specify type required when ordering)

## INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer £515
- Paper Roll £6
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £99

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

***80 Column version £23** (carr. £2.50)*
***132 Column version £26** (carr. £2.50)*

## PRINTER LEADS

| | |
|---|---|
| BBC Centronics 4' long | £5 |
| BBC Centronics 6' extra long | £7 |
| Compact's Special Centronics Lead | £7 |
| Archimedes Printer Lead 1 meter | £7 |
| IBM Parallel Lead 1 meter | £7 |
| Double Ended 36 way Centronic Lead | £9 |
| RS232 Leads (Various) | P.O.A. |

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| **BBC Micro** | – | £3.50 |
| **BBC Master** | – | £4.00 |
| **Archimedes Micro pair** | – | £9.00 |
| **IBM PCs pair** | – | £6.00 |
| **Brother HR15/20** | £3.00 | £5.00 |
| **DMP2000** | £3.75 | £4.75 |
| **EX/LQ800** | £4.50 | £4.50 |
| **EX/LQ1000** | £7.50 | £5.00 |
| **RX/FX80/85/800/MX80** | £3.90 | £4.95 |
| **RX/FX100/1000** | £5.75 | – |
| **Kaga/Taxan KP810/815** | £4.90 | £4.00 |
| **LC10 (Black)** | £4.25 | £5.00 |
| **LQ500/800** | £3.75 | £5.00 |
| **LQ1050/LQ2500** | £8.50 | £5.50 |
| **LX80/86/800** | £3.80 | £4.50 |
| **M1009/GLP** | £3.80 | £3.75 |
| **Panasonic KX1080/81** | £4.00 | £4.75 |
| **SQ2500** | £23.00 | £5.50 |
| **Star NL10** | £3.75 | £4.50 |
| **Olivetti Ink Jet Cartridges (set of 4)** | £9 | |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## *Listing Paper (Perforated)*

- *1,000 Sheets 9½" × 11" Fanfold Paper* ***£7***
- *2,000 Sheets 9½" × 11" Fanfold Paper* ***£12***
- *1000 Sheets 9½" x 11" NCR 2 Part Fanfold* ***£19***
- *1,000 Sheets 15" × 11" Fanfold Paper* ***£9***
- *1000 Sheets true A4 Fanfold Paper* ***£11***
- *2000 Sheets true A4 Fanfold Paper* ***£19***
- *Teleprinter Roll (Econo paper)* ***£4***

*(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).*

*Carriage 1K Sheets £2.50. 2K Sheets £3.00*

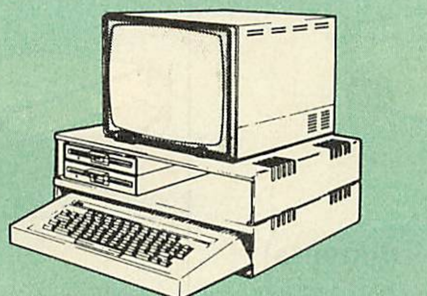
## *PRINTER LABELS*

***(On continuous fanfold backing sheet)***

| | |
|---|---|
| *1,000 90 × 36mm (Single Row)* | ***£5.00*** |
| *1,000 90 × 36mm (Twin Row)* | ***£4.90*** |
| *1,000 90 × 49mm (Twin Row)* | ***£7.50*** |
| *1,000 102 × 36mm (Twin Row)* | ***£6.25*** |

*Carriage on 1,000 Labels £1.00*

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS

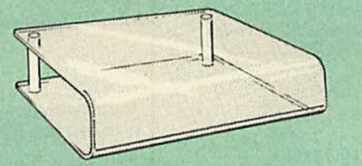


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

| | |
|---|---|
| Single BBC Plinth | **£12** (carr. £2) |
| Double BBc Plinth | **£20** (carr. £3) |
| Printer Plinth | **£12** (carr. £2) |
| Single Master Plinth | **£13** (carr £2) |
| Double Master Plinth | **£24** (carr £3) |

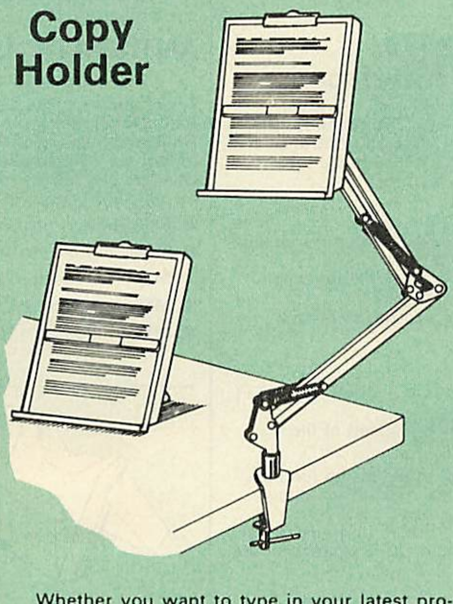
## Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

**Only: £16** (carr. £3)

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

## MEGABUFFER 256




The Smallest 256K Printer Buffer Unit in the world 38mm x 130mm x 134mm.

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

**Only £149** (carr £2)

## OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

| | |
|---|---|
| BBC Screen Dump | **£10** |
| Colour Ribbon | **£6** |
| Black Ribbon | **£6** |

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

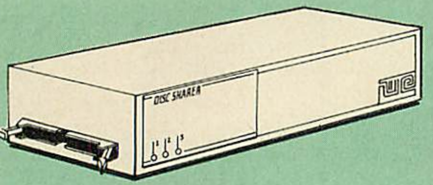
**£5.95** (No VAT)

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

Continued →

NEW

# DISC DRIVE SHARER




## (Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

## NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

## WATFORD's & ACORN's SINGLE DENSITY DFS

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£48**
- *Acorn's 0.90 DFS Kit complete* **£49**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

*(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).*

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

## Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADF9 on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

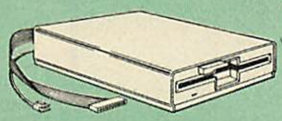
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

## DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

## 3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**

## Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

## DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

## FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It 's recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

**£6**

## ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3 ½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable



## PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

## DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.



Protection at Only: **£2**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

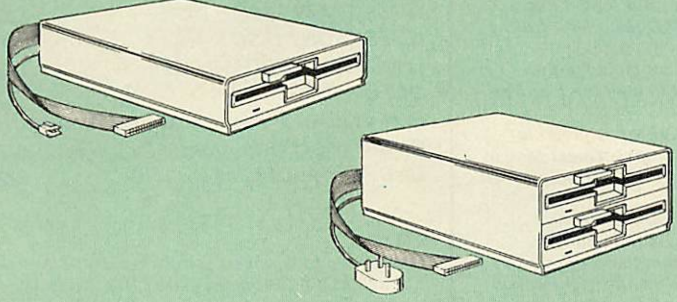
*Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 5th page of our advert for the Plinths).*
*P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**Our Disc Drives conform to BS415**



| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 200K (360K) | CLS 200 £89 | | CS 200 £98 | |
| 400K (720K) | CLS400S £82 | CLD 400 £168 | CS 400S £92 | CD400 £188 |
| 800K (1.44M) | | CLD 800S £162 | | CD 800S £182 |

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
*L = Less PSU*
*S = Single*
*D = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13**

## 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* ***£7.50***
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* ***£11.00***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£19***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3½" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3½" High Density Diskettes* ***£37***

## TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* ***£11***
- *10 × **M9** 3½" Double Side High Density* ***£34***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* ***£9***
- 10 × **M8 5¼" D/S H/D Hi-Density Discs** **£14**
- *3" Double Sided Discs* ***£3 each***




## Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

**BULK PACK DISCS in lots of 100**

| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| ● Without Sleeves | £35 | £39 | £45 |
| ● With Sleeves | £38 | £42 | £48 |



## WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!
Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350;** ● 30 Megabyte **£420**

**CDP800S** **CDPM800S**

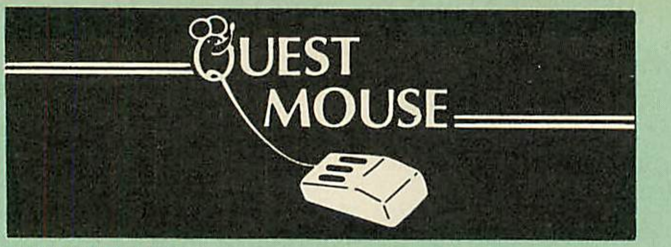


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

**CDP 800S for BBC Micro £192**
**CDPM 800S for Master £196**
**DP35-800 for BBC/Master £165**
(For DP35-800S spec. see Page 9 of our advert)
*(Securicor Carr. £7)*
(The above drive units are 2 Megabytes unformatted)

**Continued →**

NOMINATED FOR MICRO BRITISH COMPUTING AWARDS 1987




# QUEST MOUSE

*The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.*

*The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.*

# QUEST PAINT

*The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.*

*The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.*

## SOFTWARE FEATURES

*The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.*

*Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.*

*Take The Guesswork Out of Selecting a Mouse Package*
*With reviews like this how can you go wrong.*

***Popular Computing Weekly, 9-11 June '87***
*"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."*
*"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."*

***Micro User June '87***
*"Quest Mouse and Quest Paint can hold their heads high in the market. . ."*

***A&B Computing June '87***
*". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..." ". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."*
*"What we have here is probably the best art package there is for the BBC Micro . . ."*
*"Quest Paint is a major leap forward in BBC programming. . ."*
*"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".*

***Acorn User, September '87***
*"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."*
*". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".*
*"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".*
*"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".*
*"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".*
*"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".*
*"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."*
*"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".*
*"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".*

***John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:***
*"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".*

***Lt. Col. C.G. Holton, HQ 1 (BR) Corps, BFPO 39, writes:***
*"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".*

***Beeblet User Group, New Zealand Oct '87:***
*"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".*

*"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".*

*"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".*

# ConQuest

*Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.*

*Some of the features are:*

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

| | |
|---|---|
| **QUEST MOUSE & QUEST PAINT** | **£49** |
| **QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT** | **£82** |
| **QUEST MOUSE ONLY** | **£25** |
| **QUEST PAINT SOFTWARE** | **£32** |
| **QUEST FONT DISC** | **£12** |
| **ConQuest 32K ROM Package** | **£29** |
| **QUEST MAT** | **£3** |
| **Part-exchange your old Mouse for a New QUEST MOUSE for only** | **£23** |
| **GXR ROM for BBC Micro** | **£22** |

*N.B.*
*1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.*
*2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.*

# MARK II LIGHT PEN




*Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.*

***Price Only £21***
*(Price includes FREE software Disc and Operating Manual)*

## RB2 Marconi Tracker Ball

| | |
|---|---|
| RB2 (AMX/Quest compatible) | £49 |
| RB2 including Quest Paint | £78 |

## FLEET STREET EDITOR

| | |
|---|---|
| Software pack for BBC Micro | £33 |
| Software pack for the Master | £39 |
| Software Pack for Compact | £40 |
| Admin Xtra Disc Utility | £13 |
| Walt Disney Disc Utility | £13 |
| Fonts N Graphics Disc Utility | £13 |

## *THE NEW Mk III AMX MOUSE*

**ONLY: £59** **Inc. Super Art package**
(carr £1.50)
*(Please specify for BBC, Master or Compact)*

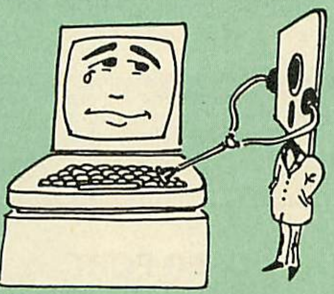
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

| | |
|---|---|
| MOUSE MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX UTILITY Package | £11 |
| AMX SUPERART Package | £34 |
| AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse | £32 |

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

| | |
|---|---|
| PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker | £12 |
| AMX DESIGN (ROM) | £55 |
| AMX 3D ZICON Disc | £19 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £16 |
| AMX MAX A gem of desktop (ROM) | £15 |

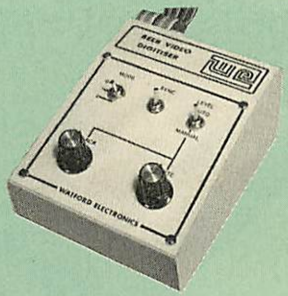
## DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

## *BEEB* VIDEO DIGITISER




Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £3)

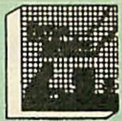
(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

## *Magazine Maker*

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.
Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.
They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.
With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.
Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.
Once created the picture can be printed out.
The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

## *OFFICE MASTER*



**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

## *OFFICE MATE*



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

## Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.
The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.
Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

**Continued →**

# ARIES CORNER

## B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

| | | |
|---|---|---|
| Price: | Aries B-12 | **£40** |
| | Aries B-12C | **£5** |

## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

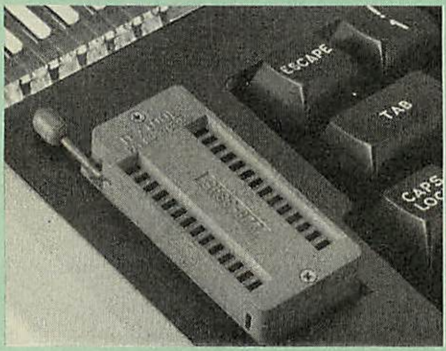
**£238** (Carr £3)

## EXTERNAL ROM BOARD for BBC MASTER

**This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.**

Only £78

## SIDEWAYS ZIF SOCKET




Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | **£11** |
| ● Spare Cartridges | **£2.50** |
| ● Spare Rack | **£1.50** |

**ROM Cartridges for the BBC Master**
Twin **£8**; Quad **£12**

## 16K DISC RAM

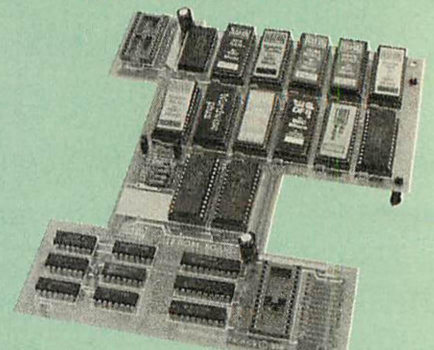
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- Supplied complete with Battery Backup.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

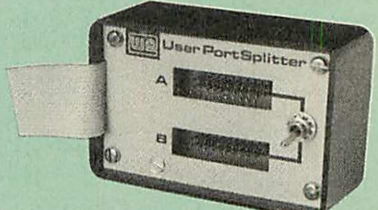
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £32**
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

**Only: £8**

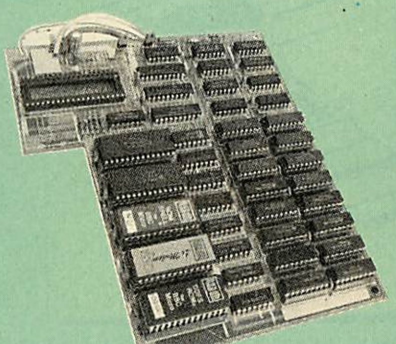
## USER PORT SPLITTER UNIT




Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

## ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

### *INTRODUCTORY PRICES:*

- ROM/RAM card with 32k dynamic RAM ...... **£48**
- ROM/RAM card with 64k dynamic RAM ...... **£65**
- ROM/RAM card with a massive 128k dynamic RAM ...... **£109**

(carriage on ROM-RAM Card £3)

### *OPTIONAL EXTRAS:*

- 16k plug-in Static RAM kit ...... **£17**
- 16k Dynamic RAM for Upgrade ...... **£17.50**
- Battery backup ...... **£3**
- Read and Write protect switches ...... **£2 each**

Complete ROM-RAM board
All options installed ...... **£115**

P.S.
**Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less**

## *Le Modem*




### The MODEM from Watford

*At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.*

*The features that make Le MODEM such good value are:*

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

### SPECIAL OFFER

*Price:* ***£75***
*(carr £3)*

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

## REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£15** (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

## APOLLO

### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

### VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | **£10** |
| Delta 3B Twin Joysticks | **£15** |
| Delta 3C Joystick for Compact | **£10** |
| Delta 14B Single Joystick | **£11** |
| Delta 14B/1 Adaptor Module | **£12** |
| Transfer Software Disc-Tape | **£7** |

### ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

### Versatile **BEEB SPEECH SYNTHESISER** Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

**Continued** →

## COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £46 |
| CARETAKER Basic Utility | £23 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| SPEECH SYSTEM | £35 |
| Printmaster | £25 |

**Wordwise** £23

**Wordwise plus** £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

## Word-Aid

**The most comprehensive utilities ROM for Wordwise-Plus**

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS DISC:** £5

**SPELL MASTER** £42

**Inter SHEET** ONLY £37

**INTER CHART** ONLY: £25

**Inter-WORD** £36

## MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

**INTERBASE £49**

All Prices Exclusive of VAT

## VIEW

| | |
|---|---|
| VIEW WORDPROCESSOR 2.1 | £35 |
| **VIEW 3.0 ROM** | **£48** |
| **VIEW PROFESSIONAL** | **£59** |
| **HI-VIEW** (for 6502 2nd Processor) | £36 |
| **VIEWSHEET (Acornsoft)** | £36 |
| **VIEWSTORE** | £36 |
| **VIEWSPELL with 80 track disc** | £29 |
| **VIEWPLOT Disc** (Please specify for Master 128 or Compact) | £20 |

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

| | |
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| **VIEW-INDEX** | £12 |
| **OVERVIEW Packs 1 & 2** | £69 |

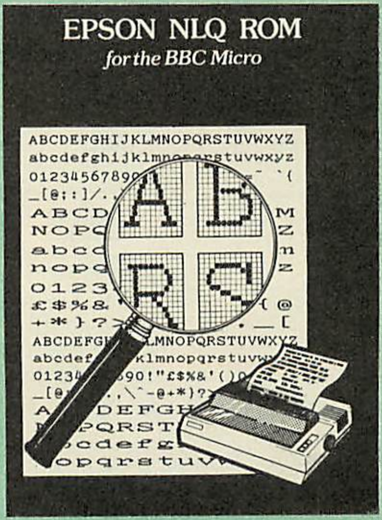
**Watford's own Sophisticated VIEW PRINTER DRIVERS**

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
| Juki & Brother HR15 (Disc) | £8 |
| Silver Reed Printers (Disc) | £8 |

**MINI OFFICE II**

| | |
|---|---|
| DISC Version for BBC B & B+ | £14.00 |
| DISC Version for BBC Master | £16.50 |
| ROM Version | £43.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc).



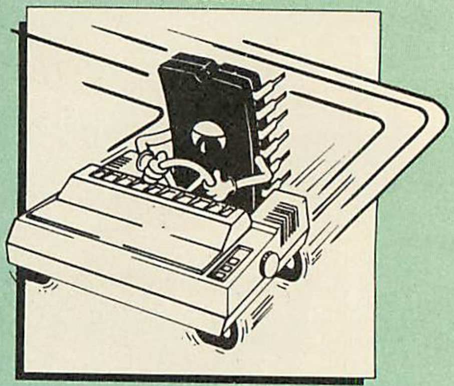

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

*(Send an SAE for sample printout)*

**Only: £25**

VIEW PRINTER DRIVER for NLQ ROM £7

## VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

## ROM-SPELL

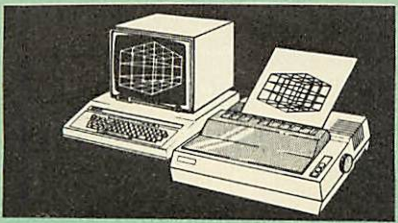



Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

*NOT compatible with 1770 DFS.*
*(Please state 40 or 80 track disc)*

**Price still only: £25**

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

*The Micro User Feb. 1985.*
*'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".*

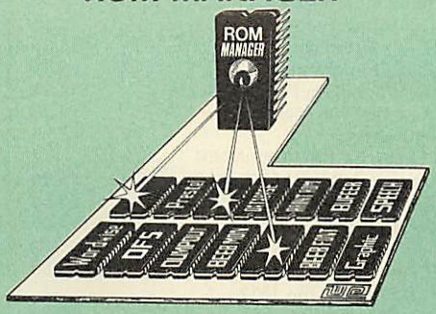
For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

**Only: £25**

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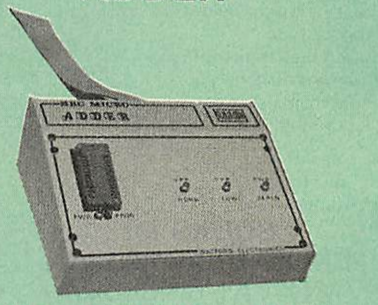
## ROM MANAGER




Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
*"Provides comprehensive management of all your installed ROMs".* (BEEBUG November '84.)

**ONLY £20**

## ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

**£75** (£3 Carr)

## TEX EPROM ERASERS

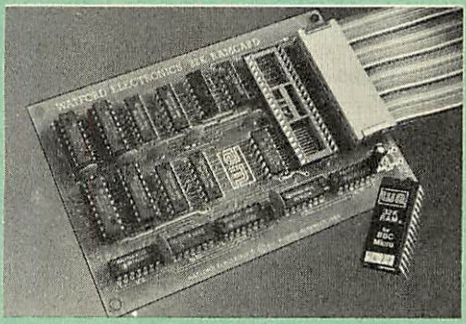
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
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- Spare UV tubes. **£9**

# 32K

## SHADOW RAM-Printer Buffer

### Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)
(Price includes a comprehensive manual and the ROM)

## INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

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NEW

## The Advanced Reference Manual for the BBC Master

At last Acorn's long awaited Advance Reference Manual for the BBC Master Series of Microcomputers has now been published. Watford Electronics' own authors have edited and added missing sections to the original script and produced a very high quality publication.

It features information about:

- Memory Organisation
- Slow data bus
- Detailed circuit description
- Keyboard controller
- Screen display
- User port
- Serial Processor
- Peripheral bus controller
- 1 Mhz Bus
- Machine operating System
- Second processors – Internal, Z80 and 80186
- Disc Filing Systems
- ANFS
- Terminal Emulator & Editor
- View internal format
- Detailed differences between Model B, B+, Master 128K and Compact
- Comprehensive appendix on 65C12 instruction set

At the rear of the manual there are pull out circuit diagrams for the Master 128K.
A worth-while addition to any Master owner's library.

**All this for just £19 (NO VAT)**

## THE COMPLETE BBC COMPUTER USER HANDBOOK

*"Why has no-one written a book like this before? It's long overdue".*
If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

**GENERAL** – Uses and abuses of computers.

**HARDWARE** – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

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**Watford Electronics are the main Approved Stockist of ACORN SPARES and Acorn ECONET Referral Centre**

### Servisol Foam Cleaner

This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

**£2.50**

### Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

**£2.50**

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Aerosol Dust Spray
This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

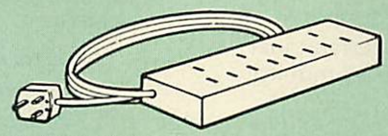
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## SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

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4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

**£7.95** (carr £1.50)

### SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

**£13.00** (carr. £1.50)

## ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

**£2**

### Replacement FLEXIBLE 17 way Keyboard Connector £3

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SOLDER type **£1.50**; IDC CRIMP type **£1.95**

### 8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

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**28 pin ZIF SOCKET (Textool) £6.95**

### Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

**£14**

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(All ready made and tested)

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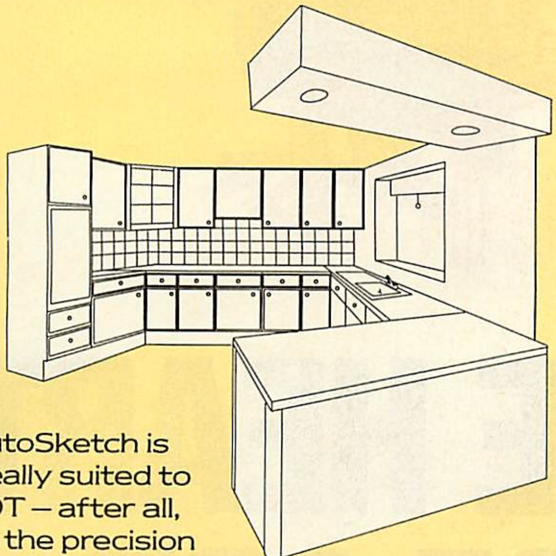
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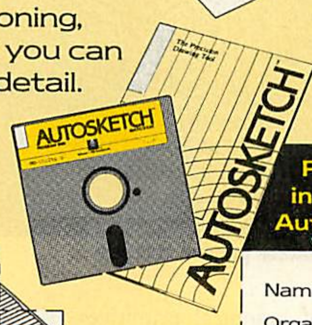
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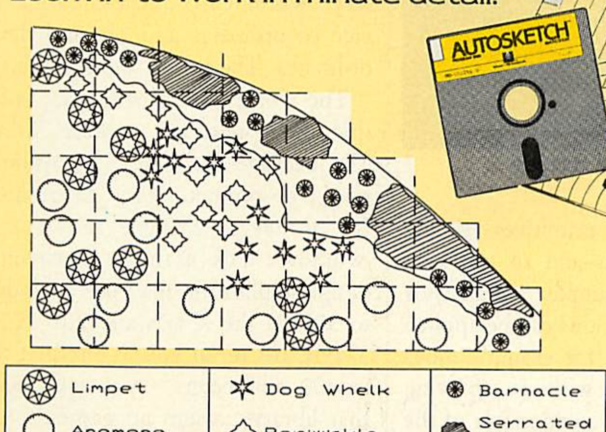
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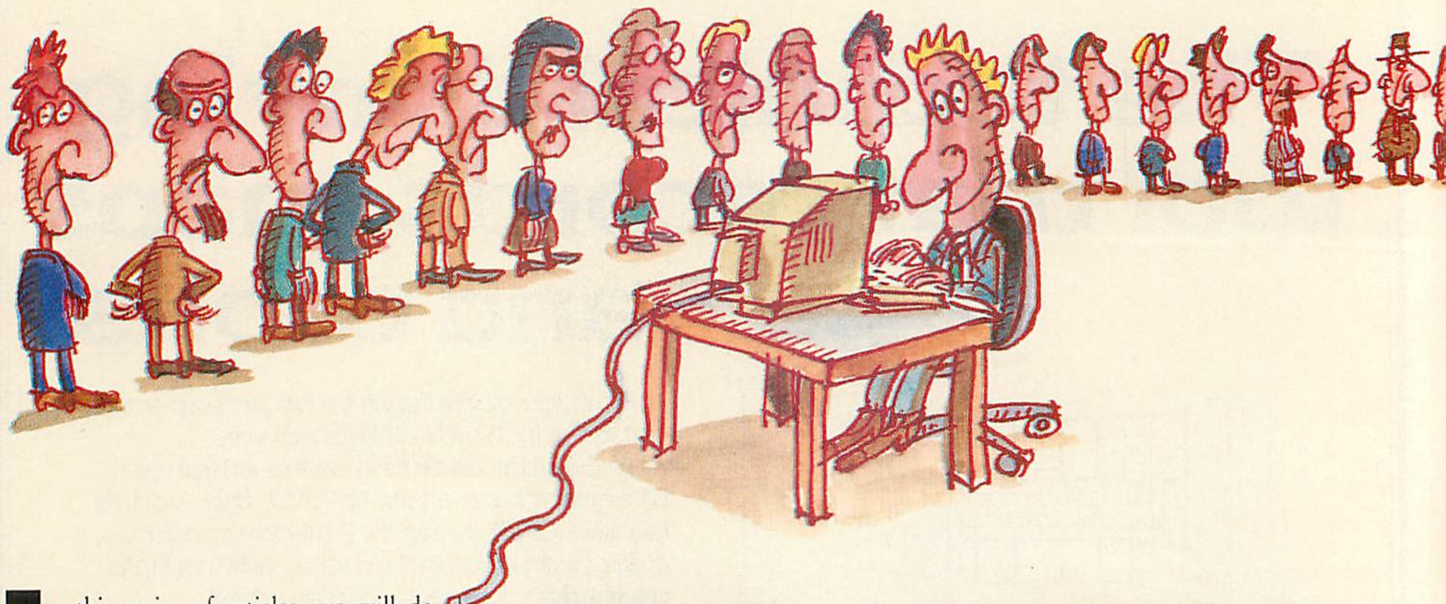
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# THE HEART OF ART

**Enhance your Archimedes programming with a central core of graphics routines**

***Guy Martin & Gary Phillips***

In this series of articles, we will describe a two-dimensional graphics library which you can use in your own Archimedes programs. The standard graphics library is called GKS, the Graphical Kernel System.

GKS was proposed as a graphic standard by the West German standards body, Deustches Institut fur Normung, in 1979 and it has become widely used on minicomputers and mainframes. It is now one of the 'big three' graphics standards, along with Core (designed by members of the Association for Computing Machinery's Special Interest Group in Graphics) and PHIGS (Programmer's Hierarchical Interface to Graphics Systems).

The library provides software that makes it easier to use graphical input and output. It is a set of procedures and functions that are generally useful. They are used as tools to make writing software easier. For example, you may have a library of database functions or a library of window-handling functions. In this case, it's a library of graphics functions.

Libraries are the realisation of the 'black box' approach to programming. For a given library routine, all you need to know are the input parameters, the output parameters, and the action of the function. You never need to know how a particular action works, only that a certain set of parameters causes a specific result. And standardisation of libraries like GKS or PHIGS means that the result would be the same on the Arc, on a DEC VAX minicomputer, or any other hardware. Well designed libraries extend a programming language by providing higher level operations than those in a language itself.

One of the main strengths of a graphics library like GKS is the ability to treat a

ILLUSTRATION BY BENOIT JACQUES



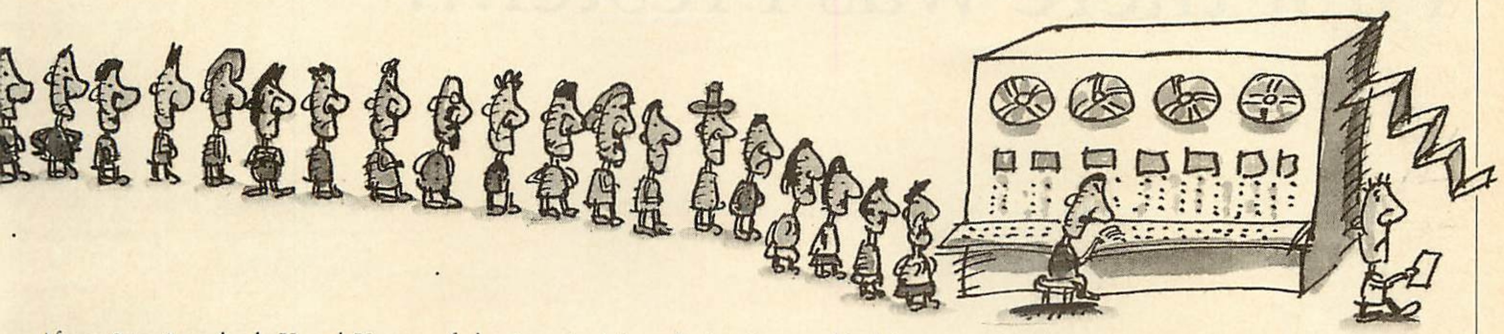

**GKS: a professional graphic standard**

collection of graphical primitives (simple things like lines, points and so on) as a single object – for example, a transistor symbol or a car. Operations can be applied to the complete object, for example moving, scaling or rotating without worrying about the effects on the components of the object. Don't confuse these objects with sprites; sprites are not constructed from primitives. The two-dimensional graphics library that we will implement allows grouped objects, technically known as 'segments', to be created, deleted, scaled, rotated and so on.

There are three different sets of co-ordinates used in this GKS graphics library: world co-ordinates, normalised device co-ordinates and physical device co-ordinates. The last of these is the screen.

The world co-ordinate space is the area that the application package 'draws' on. The package can define a portion of the world co-ordinate space to be displayed. It's always a rectangle and it's called a 'window'. For example, a circuit board design application may use a window of 0 to 300 on the X-axis and 0 to 200 on the Y-axis. It's up to you to interpret that as 0 to 300 millimeters – you must remember that libraries assign no particular meaning to the co-ordinates, but they do represent 'real world' measurements.

Normalised device co-ordinates range



from 0 to 1 on both X and Y axes of the viewing surface (the screen), giving a 1 : 1 aspect ratio. The 'viewport' is defined using normalised device co-ordinates and the corners of the world co-ordinate window match the corners of the viewport. So the viewport defines the position and size of the real-world window on the screen. So, if we defined a window as above, and defined the viewport as 0.2 to 0.5 on both axes, then the image of the window would appear at the bottom left of the screen.

The normalised device co-ordinate space is used to standardise co-ordinates across different physical devices. For example, the Archimedes screen has a co-ordinate space of 0 to 1279 and 0 to 1023, whereas a plotter may have a co-ordinate space of 0 to 3000 and 0 to 4000. Normalised device co-ordinates allow the system to be compatible across different physical devices.

Physical device co-ordinates are those used by the output device – the screen of the Archimedes, a plotter, or any other output device supported by GKS. On screen the co-ordinate range is from 0 to 1279 on the X-axis and 0 to 1023 on the Y-axis. But using our GKS package, you

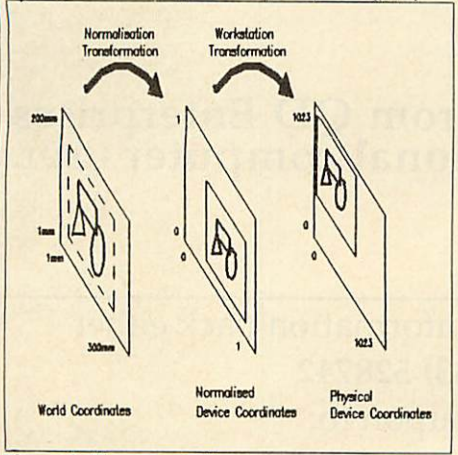



**Figure 1. Three co-ordinate systems**

never have anything to do with the physical device co-ordinates. All 'device dependent' things are handled by the library. The relationship between these three co-ordinate systems is shown in figure 1.

Before describing the functions of GKS, there's one more new concept. A 'workstation' is a device for graphical input or output. For example, a video display with a mouse is classed as an OUTIN workstation, a plotter would be classed as an OUTPUT workstation, and a digitiser as an INPUT workstation. Obviously different types of workstation do different things. In fact, this version of GKS cheats: the workstation type is the screen mode! Space doesn't allow us to implement the other classes of workstation, but the package may be extended at a later date.

The important control routines for GKS are given in table 1. The 'open gks' routine is used to start working with GKS. The parameter should specify the file handle of an error file, but is not used in this version of GKS and is included for compatibility

```
open_gs (error_file)
close_gks
open_workstation (workstation_id,
         connection_type, workstation_type)
close_workstation (workstation_id)
activate_workstation (workstation_id)
deactivate_workstation (workstation_id)
clear_workstation (workstation_id,
         control_flag)
```

**Table 1. GKS control routines**

only. This routine must be called before any other GKS routine is used. Similarly, 'close gks' should be the last GKS call used. 'Open workstation' creates a connection between the specified workstation and GKS. The parameters are the workstation ID, the connection types and the workstation type. In this version of GKS, only the workstation type is used to set the screen mode. It could be possible to extend GKS to allow windows on screen to act as separate workstations, with each window having a different ID. 'Close workstation' releases the connection between the specified workstation and GKS. Just as 'open workstation' could be extended to open a window, this could close the window.

To send all GKS output to the workstation you must use the 'activate workstation' call. The parameter is the workstation ID. Once again this call performs very little in this version of GKS, but its use is analogous to using VDU 2 to switch on the printer. After a 'deactivate workstation' call, output is no longer routed to the specified workstation. Finally, 'clear workstation' clears the display space.

Figure 1 showed how, world and normalised co-ordinates relate. A normalisation transformation controls the mapping between the real-world window and the normalised viewport. For example, a window of 0 to 300 on both axes mapping to an NDC viewport of 0.2 to 0.5 on both axes, means that a point plotted at 0,0 in world co-ordinates relates to a point in NDC at 0.2, 0.2; and 200,100 (WC) is 0.4, 0.3 (NDC), this is known as the normalisation transformation. There can be lots of different transformations, each relating to a window/viewport pair.

GKS provides three related routines to set and select normalisation transformation mappings; they are summarised in table 2.

Two routines set the WC window and viewport corners for a particular normalisation transformation. The transformation number is specified by the first parameter, the other parameters being the lower left and upper right co-ordinates of the window in world co-ordinates, or the viewpoint in normalised co-ordinates.

Once you've set up the transformations, you select a particular one by specifying the transformation number. At least 20 transformations may be set and selected in this implementation, but this may be easily changed if you wish.

```
set_window (transformation_number, x_min,
      y_min, x_max, y_max)
set_viewport (transformation_number, x_min,
      y_min, x_max, y_max)
select_normalisation_transformation
      (transformation_number)
set_clipping_indicator (clipping_indicator)
```

**Table 2. Normalisation transformation mappings**

To implement the windows and viewports, the library needs to know which parts of lines actually need to be displayed. If a line goes outside the WC window,

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then you must not display it. It's just like setting a normal VDU 24 graphics window. In fact, you can switch clipping on and off with the set _ clipping _ indicator routine. The single parameter can be CLIP or NOCLIP: if it is set to NOCLIP, then even lines which extend outside the window (and therefore outside the viewport) are drawn on the screen.

After setting up the graphics environment using the above routines, you must be able to draw something. The routines in table 3 allow lines, markers and text to be drawn. All of these routines have various attributes associated with them, for example the text routines have attributes to orientate the text in different ways or set the text size, while the line attributes affect the colour and style of a line.

A polyline is a group of joined straight lines, defined by points in world co-ordinates. The parameters are n, the number of points, and px and py, two arrays specifying the points to join up with lines. The points used are px(1), py(1) to px(n), py(n), so the polyline is made up of n-lines, joining adjacent points defined in the array.

The polymarker routine plots dots at specified points in world co-ordinates. The parameters are n, the number of points, and px and py, arrays specifying the points to plot the markers at. The points used are px(1), py(1) to px(n), py(n). The text routine writes the text string at the given world co-ordinates.

```
polyline (n, px, py)
polymarker (n, px, py)
text (px, py, text)
```

**Table 3. Routines to draw lines, markers, text**

The output routines described so far probably seem very simple. It is possible for useful applications to be written using just the default settings of the drawing functions, but more sophisticated applications require more control over them. GKS provides over 20 functions which allow you to change the attributes of output.

Graphical applications often require the display of lines noticeably different in type; for example, a graph of city temperatures would have one set of lines per city. The lines could be different colours or be differently dotted.

The function set _ polyline _ index is used to change the appearance of the lines generated by the polyline primitive. In this implementation of GKS, each workstation type (screen mode) has at least seven line styles. For example, using a workstation type with two colours, lines are distinguished by using dots and dashes. In other modes, colours are used to distinguish lines. The collection of attributes that define the appearance of an output primitive is referred to as a 'bundle'.

The following routine would produce two sets of different lines in any screen mode you choose:

```
set_polyline_index (1)
polyline (num_points, pxa(), pya())
set_polyline_index (6)
polyline (num_points, pxb, pyb())
```

The polymarker primitive has an associated function set _ polymarker _ index which works similarly to set _ polyline _ index. These select a particular bundle of attributes for subsequent drawing.

Choosing the style of a line by selecting an attribute bundle makes for simple, device-independent programming. But you are subject to the whim of the GKS system in the way the primitives with a given index are actually displayed. Line type (solid, dotted), colour and width are the three parts of the attribute bundle for polyline. The GKS system defines default sets of bundles for each workstation type, but they may be changed.

The graphic output primitives use the attributes for the selected bundle unless told otherwise by the function set_asf_individual. The converse function is set_asf_bundled. ASF stands for aspect source flags, but that's not important right now! For example, if you wanted to force the next line drawn to be dotted, regardless of the particular index you were using and the particular attributes of that index, you would do it like this:

```
set_asf_individual (ASF_POLYLINE_LINETYPE)
set_linetype (DOTTED)
polyline (num_points, px(), py())
```

The text primitive does not have bundled attributes in this implementation, and always uses individual attributes. These are described in the section below. The set_asf_individual tells GKS not to look at the bundles for the specified attribute, but to use the individual attribute setting instead. Conversely, set_asf_bundled tells GKS to look at the bundles again. Once you've told GKS to disregard the bundle attribute, you have to set the line type individually with the set linetype call.

Similarly set _ linewidth_scale_factor gives the individual linewidth setting. As only one line width is available in this implementation of GKS, this function does nothing. The colour of a line can be set individually with set _ polyline _ colour _ index. For markers there are two similar calls, to specify the size and colour of the markers. These calls are all summarised in table 4.

As well as using the predefined bundles set up by the GKS implementor, and modifying individual attributes, you can define your own bundles, or redefine the default ones. This is achieved by making a call to one of the functions ending in _ representation summarised in table 5. For example, if you need workstation zero to draw bundle four as a dot-dashed line in colour two (whatever colour two is), with a width of one (the only width available in this implementation of GKS), you could use the following call:

```
set_asf_individual (attribute)
set_asf_bundled (attribute)
set_linetype (linetype)
set_linewidth_scale_factor (scale_factor)
set_polyline_colour_index (colour_index)
set_marker_type (marker_type)
set_marker_size_scale_factor (scale_factor)
set_polymarker_colour_index (colour_index)
```

**Table 4. Calls to set markers**

```
set_polyline_representation (0, 4,
        DOT_DASHED, 1, 2 )
```

There is an equivalent function for the marker bundles. The text primitive (because of its complexity) does not have these bundles.

The line type may be chosen from the GKS standard linetypes: SOLID, DOTTED, DASHED and DOT _ DASHED, and extra implementation dependent line types. In this case the only additional line type is HEAVY _ DOT. Line width cannot be altered, but the marker size can be varied with the marker size scale factor. Marker types can be CROSS, PLUS, STAR, ROUND or DOT. The colour index is a colour number identical to those used by the COLOUR command in BBC Basic. So colour index 4 would normally result in a blue line. But this can be altered too: the set_colour_representation function is equivalent to the VDU 19 command in BBC Basic. The parameters are the workstation ID, the colour_index (logical colour), and the three intensity parameters. The intensity parameters are set differently from BBC Basic, as they specify a value between 0 and 1.

GKS provides many attributes that determine the appearance of text. The design-

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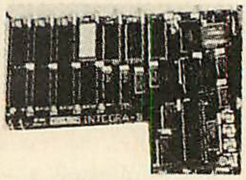
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ers wanted to provide a great deal of control over text, so provided attributes to control the colour, size, font, quality, orientation, etc. You can choose appropriate settings to suit the quality and speed of your application. Some of the text functions are workstation and implementation dependent. See table 6 for the routines affecting colour, size, font and quality.

The set_text_colour_index routine sets the logical colour number for the subsequent output of text. Set_character_height sets the character height in world co-ordinates. This value is defined as being the height of an upper case letter. Lower case descenders are not included in this value. Non-upper-case letters, punctuation, character widths and character spacing will be in proportion to the height. Not all workstations can support a full range of character sizes, but the workstation will always ensure that the text appears as close to the desired style as possible. In our implementation and many others, the character height may only be varied when using the highest quality of

```
set_polyline_representation
      (workstation_id, polyline_index,
      linetype, linewidth_scale_factor,
      colour_index )
set_polymarker_representation
      (workstation_id, polymarker_index,
      marker_type,
      marker_size_scale_factor,
      colour_index);
set_colour_representation (workstation_id,
      colour_index, red_intensity,
green_intensity, blue_intensity )
```

**Table 5. The _ representation functions**

text that is available.

The font_and_precision function is used to set the font and its precision in subsequent text output. There are three types of precision; STRING, CHAR and STROKE. The first parameter is an integer defining the font and the second parameter is one of STRING, CHAR or STROKE. STRING precision is the lowest quality of text, but is displayed as quickly as possible. It is always horizontal, from left to right, and is displayed in the standard system font. Only one character size is available.

CHAR precision is medium quality text. It is displayed as accurately as possible using the standard system font. This means that the characters are always displayed upright, text orientation on a character by character basis not being available, and characters are placed as near to their correct positions (taking into account the character height setting, etc) as the system font allows. The direction of writing and orientation of the string will follow the correct setting.




**Program 1 shows line drawing**




**Program 3 uses pan and zoom**

STROKE precision defines the highest quality of text. Characters are made up from a series of drawn lines, rather than blocks of pixels. All attributes have their correct interpretation, and so this is the slowest way of producing text. The more complicated text attributes are shown in table 7. The character_up_vector defines the vertical orientation of individual characters, as shown in figure 2. The parameters are dx and dy, the X and Y components of the vector.

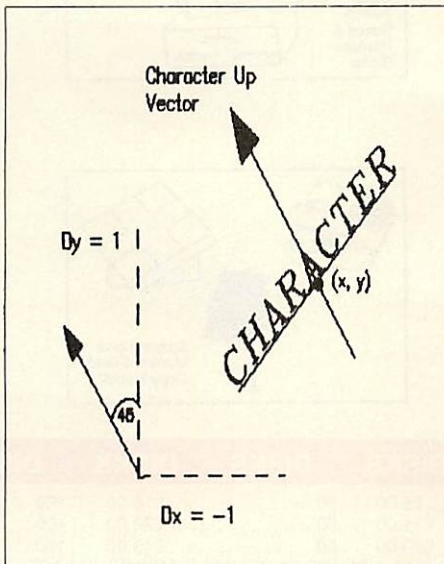



**Figure 2. Effect of character_up_vector**

The character expansion factor is normally one. Changing this value affects the width of the characters – a value less than one makes the characters narrower, greater than one makes them fatter.

Each character in a font already includes a standard amount of space around it. The set_character_spacing function enables you to increase or decrease that. The default value is zero. A value of one will insert a space of the same size as the character height between adjacent characters. Negative values cause appropriate amounts of backspacing.

```
set_text_colour_index (colour_index)
set_character_height (character_height)
set_text_font_and_precision (text_font,
      text_precision)
```

**Table 6. Routines to set text attributes**

The set_text_path parameter may take the value of RIGHT, LEFT, UP or DOWN. The interpretation of these values is dependent on the current settings for horizontal and vertical alignment.

Set_text_alignment has two parameters. The first may take the value of NORMAL, LEFT, RIGHT or CENTRE, and the second the value of NORMAL, TOP, CAP, HALF, BASE or BOTTOM. In fact, TOP has to be renamed ATOP because of a limitation of BBC Basic.

```
set_character_up_vector (dx,dy)
set_character_expansion_factor
      (expansion_factor)
set_character_spacing (character_spacing)
set_text_path (text_path)
set_text_alignment (horizontal_alignment,
      vertical_alignment)
```

**Table 7. Complicated text attributes**

Depending on the setting of text path, NORMAL is interpreted as one of the other settings.

The interaction of these last two functions is best understood by experimentation and reference to the example programs. The standard GKS text book devotes 15 pages to this topic alone!

That concludes the first part of the GKS implementation; there's more next month. The listings on the yellow pages consist of a large set of library procedures in BBC Basic, which implement these and other GKS functions. Then there are two demonstrations, which make use of the ability to draw objects and pan and zoom by altering the viewport and window sizes.

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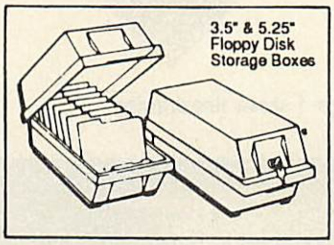
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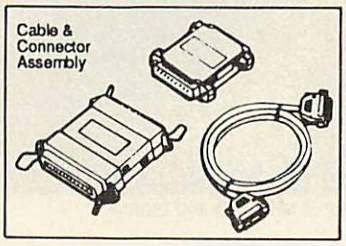
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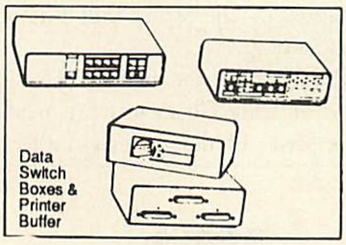
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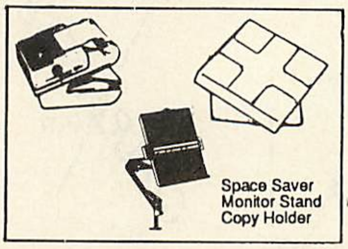
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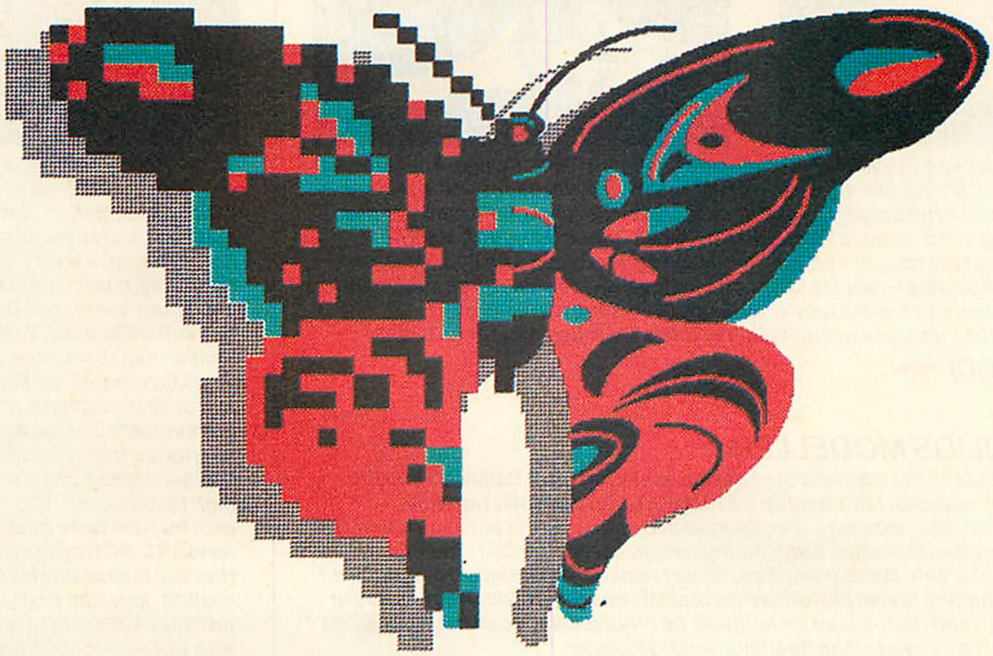
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# A STRENGTH OF RESOLVE



**The poor vertical resolution of the BBC micro is especially evident in screen dumps. Here is a program which overcomes this**

*Michael Geller*

The BBC micro's maximum resolution on screen (ignoring the Arc's multisync modes) is 640 by 256 pixels in mode 0. In this mode, the relatively high horizontal resolution is spoilt by a rather low vertical resolution. This is especially evident in screen dumps, where nearly horizontal lines appear rather chunky. The program HRDUMP overcomes this problem by producing screen dumps with twice the resolution – 640 by 512.

The technique used to double the resolution is unusual because it doesn't use a saved screen image produced by a command like: *SAVE "SCREEN" 3000 8000.

Instead it uses a *SPOOLed file, which contains all the information sent to the VDU drivers while you created the screen picture. Jim Sharp described the idea in Hints and Tips, *Acorn User* in June 1987. A PLOT statement is stored in the file as 25, since VDU 25 is equivalent to PLOT. Co-ordinates are stored in two bytes, low byte followed by high byte. So a statement such as PLOT 85,800,200 is stored in the *SPOOLED file as a sequence of bytes something like 25, 85, 32, 3, 200, 0.

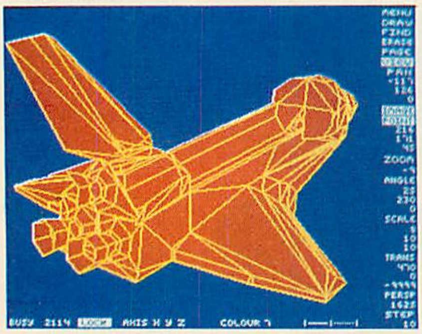
To understand how the program works, think of the final 640 by 512 pixel image as being divided horizontally into two images, each with a resolution of 640 by 256 pixels – each the same as a mode 0 screen. One such image holds the top half of the final image, and the other contains the bottom half. Each of these 'half-images' can be produced as a single mode 0 screen. To convert the original mode 0, 640 by 256 pixel screen (from which the spool file was produced), to the final 640 by 512 pixel image, requires a doubling of all the Y co-ordinates. If you imagine reconstructing the original *SPOOL file but with the Y co-ordinates doubled, then the lower 640

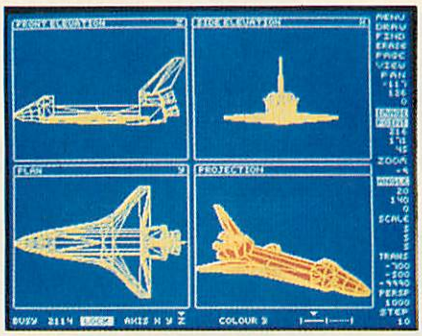
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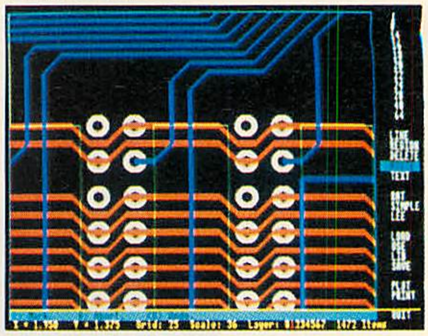
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by 128 pixels of the original image will fill the 640 by 256 pixels of the screen – forming the bottom half-image. Half of the original screen has doubled its resolution to 640 by 256. But of course anything in the top half of the screen will also have had its Y co-ordinate doubled, and will be off the top of the screen. If you now repeat the process, but with the graphics origin moved to −1024,0, you will see the top 640 by 128 pixel half of the screen expand in a similar way (to form the top half of the final image) – with the lower part of the image off the bottom of the screen. So you can convert a 640 by 256 screen into two screens, each containing half the original image, and each at 640 by 256 pixel resolution. The overall resolution of these two screens is therefore 640 by 512. The final high-resolution image can be produced by screen-dumping the top screen, followed by the bottom screen underneath it. Note that the aspect ratio of 1:2 is corrected at the printing stage, to produce a correctly proportioned print-out. Figure 1 tries to clarify the process graphically.

The BBC micro's graphic system is capable of using co-ordinates which are off the visible screen, and displaying only those parts which refer to the screen. This makes programming of the above algorithm very simple. In practice, the program produces the two half-images in a FOR... NEXT loop that executes twice. The variable ygroff% holds the offset of the current half-image from the origin of the final image. When this is set to 1024, and the Y co-ordinates have been doubled, only the top-image is displayed on the screen. When ygroff% is zero, the bottom half-image appears on the screen. FNgetfile is used to prompt the user for a filename, and to check that it is valid. This is done by the OPENIN function: given the filename, it will return zero if the file can't be found. You are prompted for another filename if it is necessary. Then, each byte of the spool file is read in using BGET#, and is then used accordingly.

PROCplot handles all the variations of the PLOT statement. This should include all the extra graphic commands included with Acorn's GXR graphic extension ROM, as all bytes sent to the VDU drivers are included in the spool file.

If the byte is a normal printable character, it is printed in double-height, since at twice the vertical resolution, text characters need to be 16 pixels high, not the usual eight. PROCchar handles the double-height printing by calling Osword with A%=10, which returns the byte values of the character, and then using each byte twice. Two user-defined characters (254 and 255) are used as the top and bottom half of the double-height character, and this means that characters 254 and 255 should not be used in the program that creates the screen display. Any other user-defined characters you use should be in the range of 224 to 253.

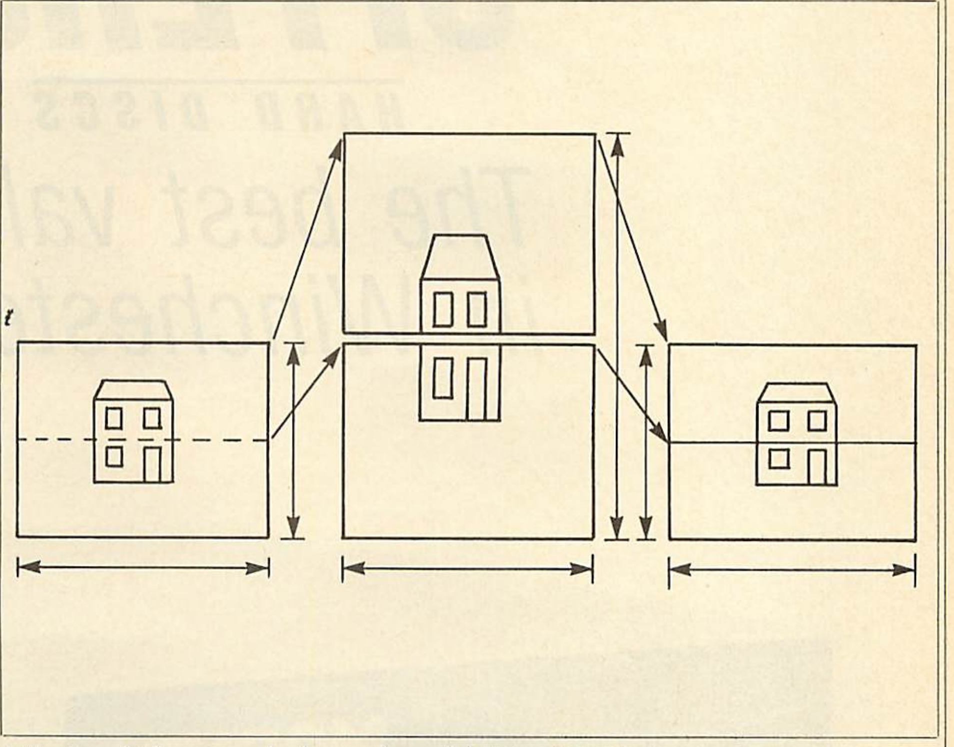


**Figure 1. A picture is printed double-height on two screens: the screen dump halves the height and doubles the resolution**

The variable ytxtoff% contains the text offset from the real text origin, and xtxtpos% and ytxtpos% hold the position of the cursor on an 80 by 64 matrix. They are assigned various values in PROChome and PROCtab, which handle VDU 30 and VDU 31 (Print Tab) respectively. PROCnewline takes care of carriage returns (VDU 13). Graphic windows are dealt with by PROCgrwindow, which limits windows to the current half-image on screen. The problem is that if a graphic window is defined where one of the corners is off the screen, then the definition is ignored and the whole screen is defined as the graphic window. This is unlikely to occur in normal programs, but by doubling all the Y co-ordinates, a mis-defined graphic window is quite likely to occur. The program limits the lower and upper Y bounds of the window to the current screen. PROCorigin controls the graphics origin when it's redefined by VDU 29, taking into account the offset of the current half-image.

Two useful functions, FNxval and FNyval, read two bytes from the spool file and return them as a 16-bit co-ordinate. FNyval also doubles the co-ordinate to

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take into account the doubled vertical resolution. PROCvdu(no%) reads in, and prints, no% bytes from the file. Finally, PROCerr clears the screen, closes the file and turns off the printer before printing the error message and line.

At the end of the main loop, each half screen is saved, ready to be printed. Once both screens have been saved, PROCdump is called to print them. The dump algorithm does not print one screen on top of the other as I originally planned. This is because the final high-resolution image is proportional – used objects on screen are printed circular on paper. This meant using the ESC "*" 5 command on my printer. Your printer must support this code to run the program. However, this printing mode only allows 576 dots per line on most printers, and the final image requires at least 640. To overcome this, the final image is rotated by 90 degrees so that the Y-axis, which is 512 pixels long, is horizontal. There is an advantage in printing this rotated image, since it is possible to access the screen memory, and send the bytes directly to the printer. This is faster than using the POINT function, which is normally used in screen dumps; however, unlike POINT, it is incompatible with shadow RAM. Another disadvantage of this method is that each half-image has to be loaded in off disc for every row.

To produce the spool file, two commands need to be added to the program which displays the original screen. The first is normally after the MODE 0 statement, and takes the form *SPOOL ‹file›. ‹file› is a filename which will be needed again at the start of the dump program. The second command is simply *SPOOL and should be placed at the end of the program when the screen display is complete – often just before the END or STOP statement. Then run this amended program, and when it has finished, CHAIN the dump program. There's a sample program, listing 2 in the yellow pages, that produces an example spooled file for you to try.

There are several ways in which this program may be modified and extended. Master 128 and Compact users may want to modify the program so that the spool file is loaded into sideways RAM before use. Shadow RAM could be used to store the top half of the screen while the bottom half is in normal RAM, so that much less disc access is required, and the program will run much faster.

It is also possible to modify the program so that it will work with printers which do not support the ESC "*" 5 code. To do this, type in the lines below:

```
1172 LOCAL temp%
1175 temp%=(BGET#ch%
+BGET#ch%*256
1180 IF temp%>32767
THEN temp%=temp%-65536
1185 =5/3*temp%
1430 VDU 1,27,1,75,1,0,1,2
```

This selects the single-density graphics mode (480 dots per line), and changes FNyval, so that instead of doubling the Y co-ordinate, it multiplies it by 5/3. This compensates for the lower number of dots per line in the final dump. It also takes care of rounding errors, which can cause problems in this program. These modifications produce a fairly good proportional dump with a resolution of 640 by 426.

In principle, resolution of the program can be increased almost indefinitely, by multiplying the X co-ordinates as well as the Y, but in practice, the printer's maximum resolution will be the limiting factor. A printer which can print 1920 dots per line, and perform 1/216 inch linefeeds will be able to dump a screen at a resolution of 1920 by 2160. This is achieved with the image rotated by 90 degrees (as in this program), and requires the X co-ordinates to be multiplied by 3.375, and the Y co-ordinates by 7.5. A program to achieve this resolution will therefore use a matrix of eight by four mode 0 screens (as opposed to two by one for this program).

If an enterprising reader can write a program to dump at this resolution, *Acorn User* will be very interested in it!

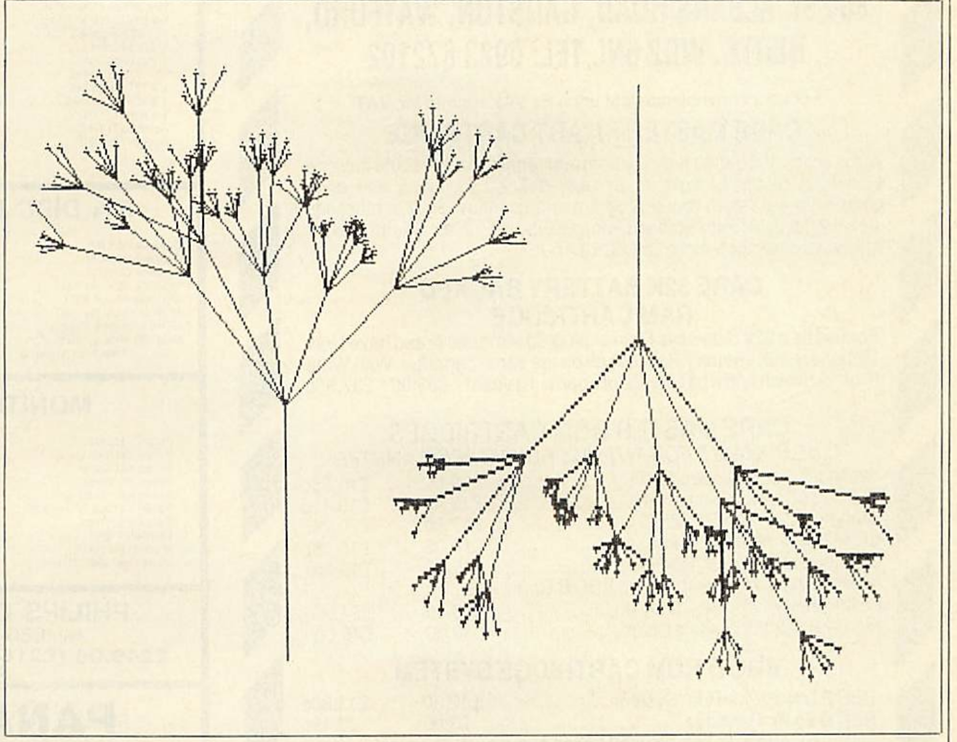


**Figure 2. HRDUMP doubles the vertical resolution making lines finer. The recursive trees are drawn from Acorn User, December 1985**

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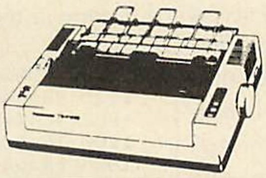
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## Operating the program

The progam owes its conciseness to the recursive nature of the procedure called PROCtree. Recursion is always the best tool for hierarchical data structures such as the directory structure used by ADFS. The Advanced Disc Filing System has been discussed in Hints and Tips in the September, October and November issues of *Acorn User*. For a discussion of recursion, see 'Recursion Excursion' in the December 1985 and November 1987 issues. The main thing to be wary of is that you do not upset the stored values of variables that are used at lower levels of recursion. To do this, you just make everything a local variable within the recursive pot.

The program will work with one or two drives. However, a major feature would certainly be lost if you have to stick around to supervise its operation and swap discs after each 16k or less of transferred data – it's much better with two drives. On CHAINing the program the first prompt is for one or two drives.

What happens next depends on your drive configuration. On a twin drive system you are requested to put the source disc (the one which may have a bad FS map) and new destination discs in, and the next prompt is displayed. With a single drive, you are requested to insert the destination disc and then press Space. This will then be marked so it can be distinguished from the source disc. The source disc is then requested. The next two prompts are quite similar. The first one requests the name of the source directory you intend to copy from. The second requests the pathname of the destination directory you intend to copy to. By now, especially if you've read the ADFS advice in Hints and Tips, you should understand the concept of pathnames.

They are lists of directories, one inside the other, separated by full stops, that lead from the root directory $, to the required file or directory. The diagram on page 81 shows a library structure. The contents of this directory (six files) and all subdirectories (one containing three files) will be copied to the destination directory.

The directory structure will be copied to the destination directory,and will be created on the destination disc as required. If you want to copy a whole disc onto a newly formatted disc just press Return at both prompts. This would be much like a slow *BACKUP, except that the resultant disc is also compacted.

The program then searches the source disc for the required directory. If any entry in the path cannot be found, then the source and destination directories are re-requested. When searching the source disc the 'master sequence number' of $ directory is also stored. This is then used to distinguish it from the destination disc.

Finally the main procedure is entered and the copying commences. When only one drive is used, the source disc is prompted for. As it is already there, you just have to press Space. The first directory catalogue will be loaded and the destination disc requested. If all goes well then the destination directory will be titled and any subdirectories created. Following this, the source disc is again requested to start loading the first file or, if there aren't any files, the first subdirectory.

That's if all goes well. You may get a 'Not found at line . . .' error reported and find yourself back at the source directory prompt. This means that a directory in the destination path does not exist and you have to start again. Another error could be 'Bad name' which means an entry in the path is either too long or contains charac-

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ters that aren't allowed in filenames – for example '&'. Both of these errors will take you back to the source directory prompt. Most other errors will stop the program, but most disc errors won't. If a disc error seems important (it probably will be) you will have to Escape to get out. Some 'at sector . . .' errors will cause the drive to retry the disc operation.

## Before using the program

There are four things to note before you use the program. When using one drive, the program prompts for the appropriate disc. If the wrong one is supplied, it tells you so. The 'Insert SOURCE disc' prompt is accompanied by a two-tone beep; the prompt is not. When you are copying a whole disc, it is easy to get out of sequence with only one disc in each hand – this may help to prevent too much confusion.

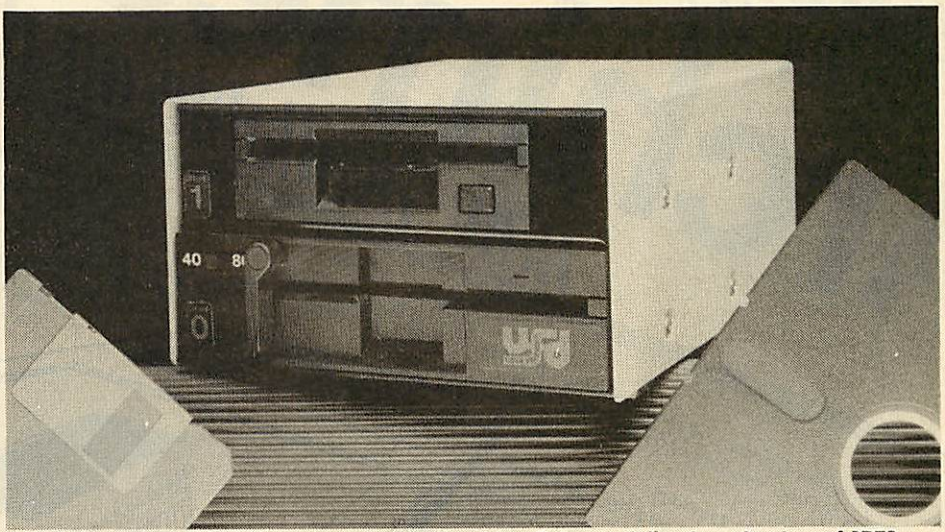
The second point is that although each disc is checked to ensure the right one is used, you can copy between directories on the same disc. This is because the test made is different for each disc – one checks the disc title, one the sequence number. To do this, first tell the program that you only have one drive. Then just don't swap when requested to at the start, and you won't have to from then on.

Third, when copying a subdirectory structure, you might want to first create a destination directory on the new disc. The program does not create the top directory you copy. The entries that are already in the source root directory will be merged with those already under the destination root directory.

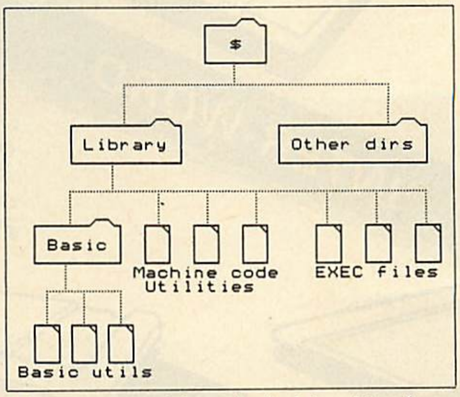
Lastly, the size of the buffer used in file transfer is whatever memory is left on your machine after everything else has been considered. On my model B, it is only 12.75k with PAGE at &1E00 and using mode 7. A Master gives 17.75k using all the Shadow modes. It is possible to transfer a file that is longer than the buffer – it requires two or more disc swaps.

On the destination disc, a new file of the required length is created. The file is then transferred by repeatedly filling the buffer and writing to the new disc. A file that fits entirely within the buffer is saved in one go, a much quicker method.

To give some idea of what to expect, the program was tested with a full disc under three conditions. The directory structure used had three levels and 12 directories. In all there were 88 files that filled all but about 20k of the disc. With a single drive, transferring everything to a new disc took




***CopyPact* operates better if you use a double disc drive. Below, subdirectory structure of ADFS**




30 minutes; with a dual drive it's about twice as fast. If you wait for the disc drive light to go out before removing the disc each time, it can take 45 minutes because the disc stops spinning between each disc swap. Just over 200 swaps were needed on a model B – you can see why a dual drive is a good idea.

## Program structure

There are a few sections of code that you should be aware of before tampering with the program. The more interesting procedures will be briefly described in turn.

PROCinitial sets up some constants and static variable pointers. You should note that these pointers each begin with a capital letter. This is an attempt at distinguishing variables that point to a block of memory from all the dynamically allocated data. Read% and write% are 1770 disc controller commands.

PROCdrives does little of interest. PathD$ is set to the appropriate drive number according to whether you have one or two drives, and PROCmarkd is used to mark the destination disc. PROCmarkD places a recognisable string in the reserved space after the directory title of the $ directory on the destination disc. This space is then read later on to ensure the destination disc is being accessed.

FNrootdir accepts from the keyboard both the source and destination directories involved in the copying process. Any preceding full stop or $ entry is deleted from the pathnames. The master sequence number of the $ directory is then read from the source disc to be used to distinguish it from the destination disc.

FNsectof determines the sector of the source root directory. As the routine follows the pathname, any entry not recognised will result in an error, and you'll have to type in the directory names again.

Because the source disc possibly has a corrupted Free Space map, the usual filing system routines to access the disc are of no use. So Osword &72 is used to read this disc. This action extends to the checking of the destination disc, as this routine may inadvertently be accessing the faulty disc. Since you are using the low level Osword call, finding the filenames and disc locations that are stored in a disc directory must be done by the program – you can't rely on the usual routines.

PROCtree is the main procedure of the program. It is recursive, and it controls all directory transfer. A global variable, pathd$, holds the path to the current destination directory. At successive levels of recursion, the string gets longer as the name of the directory above is added. On exit from PROCtree, and so stepping back up the recursive tree, this extra bit is taken away from the string, making it shorter.

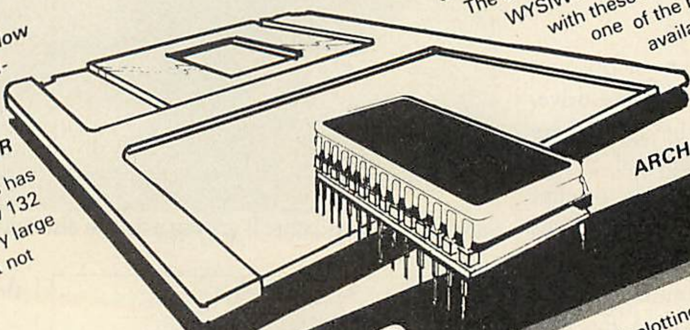
The second action of PROCtree is to load the corresponding source directory, the location of which is supplied by the calling level of the procedure as a disc address – this is just the number of the sector on the disc. The destination directory is now given the same title. There then

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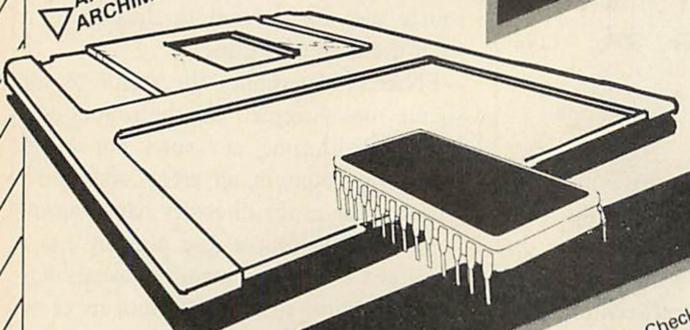
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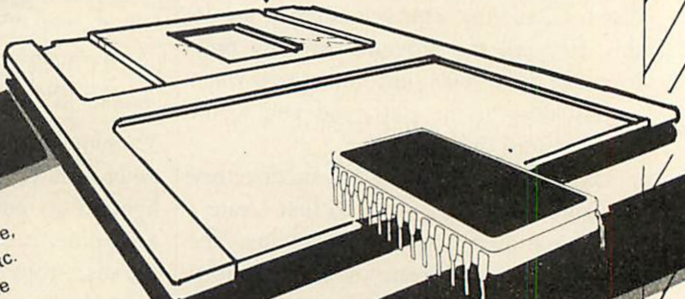
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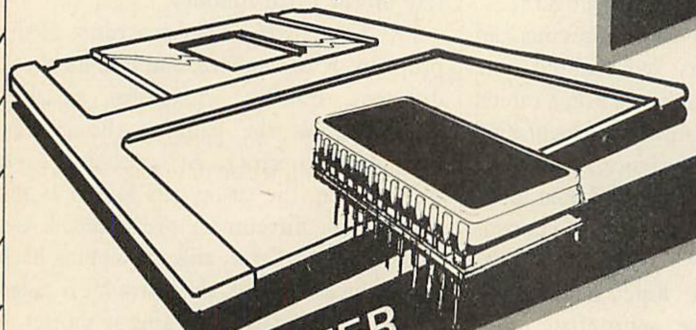
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follows three loops; subdirectory creation, file transfer, and recursion to transfer any subdirectories. The first loop calls FNcdir for each directory entry found in the current directory. The second calls PROCcfile in the same way. The third calls PROCtree recursively for each subdirectory previously found.

## GOTO simulates WHILE

These loops contain GOTO statements, usually worth avoiding. If the program were written on an Archimedes, the four 'REPEAT:IF . . . THEN UNTIL TRUE:GOTO . . . structures would have been replaced by more straightforward 'WHILE . . . ENDWHILE'.

GOTOs could have been avoided in the BBC micro version of *CopyPact*, but the flow of the program would probably have been more cryptic and perhaps even a little longer. The 'endwhile' statements are REMs, with @ characters. This comes from the Basic editor, which allows GOTO line numbers to be replaced by labels in this form.

FNcdir does three things. It gets the subdirectory name, pushes it on a stack of such names, and creates the directory on the destination disc. FNname is used to extract the directory name from the memory copy of the source directory, because it may be stored without a carriage return character on the end. Note that all access to the destination disc is performed using high level filing system commands.

PROCfile copies the file, the name of which is pointed to by the supplied parameter. First the file name, parameters and attributes are obtained by PROCinfo. Then the program flow diverges, depending on the size of the file. If the file will fit wholly within the available memory buffer then PROCqcfile is called. Otherwise, the destination file is created to the correct size by PROCcreate, and the file is then copied via PROCload and PROCsave in a minimum of steps. Lastly the correct file attributes are written.

FNname gets 10 characters from the location supplied and puts them at location Temp%. It clears the top bit of each character – these are used to hold the file attributes. A Return is then added before returning the name as a string. Note that there may already be a Return character within the 10 bytes, as this is used by the filing system as a terminator of short names, but this sorts itself out.

PROCcreate simply calls on the filing system to create a file of the specified size. At this stage the contents of the file are rubbish – in fact it is whatever was on the disc already. The dummy file has to be written with the proper contents later.

PROCload uses PROCreqsrc when only one drive is in use, to prompt for a disc change. That drive is then selected as current and the file loaded via PROCdo72. PROCreqdst may then be called like PROCreqsrc, to prompt for the destination disc.

PROCdo72 is the most basic disc access procedure: it uses Osword &72 to transfer several sectors directly to or from the currently selected disc. This is used for three things; to load all or part of a file, to load the current directory, and to load and save part of the $ directory of the current disc for checking that it is the right one.

PROCsave uses Osgbpb to transfer the part of the file in memory to the destination disc. The file is opened by OPENUP and closed using CLOSE#. The file is opened and closed for each buffer load, because it is not possible to keep the file open while swapping discs over on a single drive system. When the source disc is reselected for the next section of a file, ADFS complains because the current disc is being dismounted, and you cannot dismount a disc while files on it are still open. This does not occur with double drives as both are considered to be mounted even when only one is selected at a time.

PROCchkdisc is only called when a single drive is being used. It selects the current disc and loads the last sector of the $ directory. If seq% is less than 256 then it contains the master sequence number originally read off the source disc, and it is compared with the sequence number on the disc just loaded. Otherwise the sector is checked for the recognition string that was written on to the destination disc. If the appropriate disc is not found, you are prompted to try again: PROCrequest prompts with either 'Insert SOURCE disc' or 'Destination disc'.

FNleft is my favourite routine of the program. Given a list such as a pathname, it returns the left-most element, and assigns the remainder to r$: this is used as the parameter when PROCleft is called on subsequent occasions.

FNupper is a reasonably standard routine, converting all lower case characters in a string to upper case.

PROCcall is interesting mainly because A% and X% are assigned in the parameter list: it is easier this way than having separate parameters and using something like A% = param% and X% = param2% before a normal CALL statement. Just before the CALL command in PROCcall, the low byte of X% holds the low byte of the address of the parameter block, the low byte of Y% holds the high byte of that address, and addr% holds the call address of the required operating system routine.

PROCoscli uses a similar technique to PROCcall; the static variable pointed to by clibuf% is assigned in the parameter list. Both dollar ($) and pling(!) allow this, but query (?) will crash Basic on exit of the procedure if you have Basic version 1. Later versions can use '?'. You can even use such constructs as; ptr%!5, !(ptr%+5) and $(ptr%+5) within the formal parameter list. However, using something like 5!ptr%, or 5$ptr% will again crash Basic 1.

FNdiscerror is always called after an Osword &72 – the procedure exits immediately if no error is indicated. Otherwise, an Osword &73 is performed to establish the sector in which the error occurred. There are two types of disc errors, software and hardware, as indicated by PROCerrsoft and PROCerrhard. After reporting the error and waiting for three seconds, the routine exits with TRUE indicating a hardware fault or FALSE which means a software fault.

PROCsyserror, after reporting the error, will restart the program from a convenient point if the error is 'Not found' or 'Bad name'. These errors are most likely to occur before any copying takes place due to a mistyped destination pathname in PROCrootdir. Errors incurred during copying will probably require at least some directory deleting on the destination disc before rerunning the program.

## Where is CopyPact used?

*CopyPact* is the sort of utility that you hope never to require, at least in its capacity of fixing a 'Bad FS map' error. Still, now you can be sure of being able to get out of trouble. Other errors which it will attend to are 'Compaction required' or 'Map full'. Another error which it is capable of handling (at least partially) is 'Broken directory'. However, this is not always guaranteed.

This utility was originally written because of a DFS that worked in both single and double density. When saving data, it automatically sensed the density and did the job. Unfortunately, if an ADFS disc was provided it didn't care and just wrote the file and a new DFS directory right where it wasn't wanted. We live and learn.

# BACK FROM THE BRINK

**The concluding chapter of the Acorn story. It took a risk with the Archimedes – a RISC that's now paying off**

*Carol Atack*

The future of Acorn depends largely on the success of its 32-bit RISC processor and the machines it builds to harness the ARM's power. As Acorn decided to by-pass the industry standard based on the IBM PC, these machines would have a hard time proving their potential. Customers are often too cautious to grasp every computing revolution. What led Acorn to choose this path which many astute observers thought would lead it straight into the wilderness?

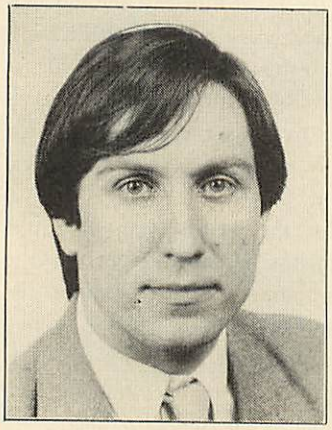
One answer lies in the devotion to the pursuit of the most advanced technology. This is at the heart of the company's philosophy. Almost irrespective of what the marketing men said would sell, Acorn's research and development teams lived for the new and exciting. If they saw a new path to take, they would take it.

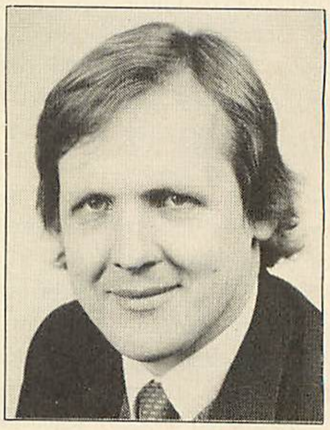
Roger Wilson explains what it was that led him and the rest of the team to RISC: 'The jump to 32-bit was a result of all the work on second processors for the BBC micro. By using the Tube, we were the only people in the world who could use the same operating system with all the different processors. We could rate their performance. We ran through every single processor – and the 8086 and 68000 chips that we tried were really slow. They couldn't even keep up with the Tube protocols that the 6502 managed.'

'In '83 when the IBM came out, we saw that it was slower than the BBC, even without a second processor. We rolled around the floor and cackled, but it was time to do something about it. We didn't want to do anything with 16-bit as we could make eight-bit things that went faster, so we said right, we'll go for 32-bit. That was September '83.'

They tried looking at the 32000 series of chips and this work resulted in the 32016-based Cambridge Workstation. But they found them too slow and too expensive – 'We wanted something which could run high-level languages as fast as our lovingly hand-tuned 6502 machine code. The 32000 chips we had been looking at were four or five times too slow. So that was the original spec for the RISC machine: we were determined to build a processor which ran Basic as fast as 6502 machine code. There weren't any on the market.'

So Roger Wilson started work on designing the instruction set – what the processor should do. Steve Furber worked on the chips hardware. But not all the work was done by Acorn stalwarts; previous problems with chip design led Wilson to recruit new staff and find a fresh system to design it. 'We had decided that the real problem with our chips and with everyone else's was the design system. Every one we built used a new design system, and we had to debug that while designing the chip; it was that new. We wanted to use somebody else's design system so that if there were any problems they had to fix them.'





**Roger Wilson (far left) and Steve Furber. These are the men who actually invented the Acorn RISC chip and, opposite, the ARM chip – the heart of the Archimedes**

A company called VLSI Technology Incorporated (VTI) was keen to help Acorn. As well as making the ARM and its associated chips, it makes all Acorn's ROMs and two of the custom chips for the Master. The first designs for the ARM were done by September 1984, and the first sample chips were returned by VTI in April of 1985. They worked properly the first time, and the continued use of the same design tools has ensured that all the chips since have also worked.

The machine Acorn hoped to build with the new chip was for the business sector – Hermann Hauser's long-held dream of office automation. Previous efforts such as the Cambridge Workstation had not achieved all that was hoped, and the chip had to be flexible to cope with the frequently changing demands made of it.

After a trip to California, Hauser decided that the work being done on Wimp interfaces at Xerox was what he wanted to see on the new machine. The Acorn Research Centre at Palo Alto was established to work on this, doing even very basic research like what keys a keyboard should have. The centre ended up employing many expatriate British computer experts who had not found enough outlet for their energies in Britain. Brain drain scientists had turned to a British company in Silicon Valley instead.

By 1986, the full four-chip set was working, and a second processor version of the ARM was built for software development. 'We did a lot of software development both in the UK and the States, and a Xerox-like operating system was developed,' explains Wilson, 'This was called ARX. We had it working well on just a single chip – a windows system with VDU calls across the Tube.'

Although the chips performed well and ARX looked promising, understandably, the company had cold feet about launching

a computer which included both a new operating system and a new chip set.

To establish at least one of the elements, the ARM evaluation system consisting of the second processor box, was made available commercially. 'It was a good move', says Wilson. 'A lot of researchers in Cambridge began to use the chip – every programming language known to man was written for it.'

However, few were sold; Acorn's 'many crashes and disasters' during the period of development did not inspire confidence. Those who persevered, out of curiosity or for research purposes, found their confidence was repaid; Mike Harrison did a PhD on image processing on the evaluation system, and later produced the Watford video digitiser for the Archimedes. The evaluation system gave people a head start in planning things for whatever machine Acorn did bring out.

Some progress was made. A prototype 4M6 machine, the A500, was used inside Acorn at Cambridge and in California. The ARX operating system began to look better, and things like graphics standards were settled on. But a finished version of ARX was always 'just around the corner'.

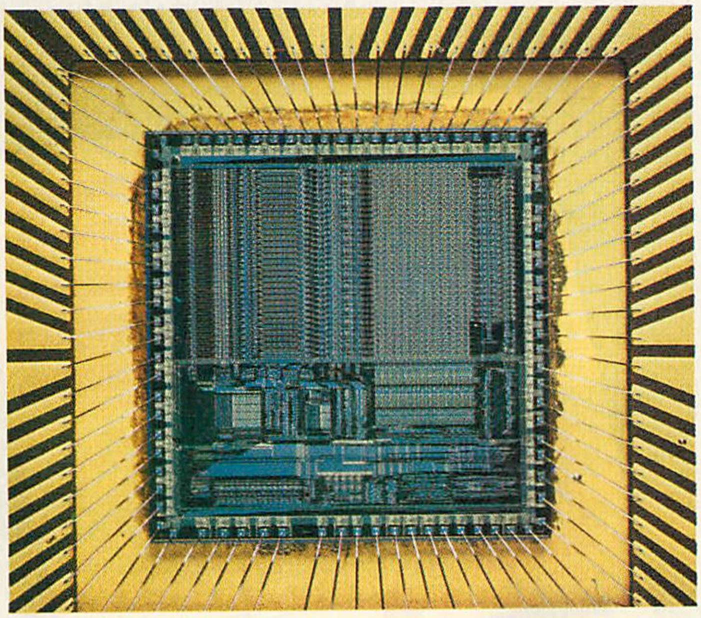
'ARX was late, very late. It became a black hole into which we poured effort,' says Wilson, 'Eventually we knew when it would be finished, but the projected date was too late.' Some observers note that the problem was this: the Cambridge end expected a marketable, working operating system, but the Californian researchers were simply playing with the idea of an operating system and seeing what they could produce. The final result was a Macintosh-like environment, but as new bits were constantly being added and refined it was never finished.

'Because ARX was so late, in September 1987 we decided to rethink the machine we were producing and put a BBC-like operating system on it, instead of ARX' explains Wilson. 'It took about 12 months from inception of this new plan to version 1.2 of Arthur being sent out.'

Because the original ideas for an ARM-based computer had been for a business machine, Acorn's traditional partner, the BBC, hadn't been involved in the project (neither had new owner Olivetti). However, Acorn eventually took the idea for the new micro to the BBC, saying it was the true successor to the BBC micro. 'The BBC said it was interested, so we put some red function keys on it and changed the case colour. Our original research for the office automation machine had said it had to be grey,' says Wilson mischievously.

The BBC's decision caused a storm when the Archimedes was released. Acorn's competitors were furious that such a new and untried piece of technology was getting BBC approval.

Other changes were required for the Archimedes to emerge. A new keyboard was chosen, as the specialised function keys on the ARX keyboard, seen only on the A500 development machine, were now redundant. An IBM-style design was substituted as more appropriate for a small business/educational micro. The price was reduced to fit the BBC philosophy of affordable computing. But most problems arrived with the new, last-minute, operating system.



Roger Wilson explains: 'All operating system geniuses in the company were firmly working on ARX, so we couldn't actually spare any of the experts to work on Arthur. It was given to a team of application programmers.

'Various people had experience of operating systems from quality audit work, and they had identifiable skills, but some people were brand new; the man who wrote the windows manager was a games programmer. Strangely, this turned out to be the best thing we could have possibly done. People who've written games are good at making windows appear on the screen and making them move around.'

Although the scratch team adapted well to the task, they'd not written an operating system before. Team leader Paul Fellows also lacked operating system experience. Corporate communications manager Michael Page disagrees that the hurry caused problems. 'There was a desire to have facilities in Arthur which hadn't existed before, but there was also a need to sell a finished product. So there is also a view from a marketing side, and in particular that concerns timing.'

Ultimately, the marketing men won out, and the great Archimedes machine was launched in August 1987, before Arthur was even finished.

It was the subject of immediate controversy, from the BBC brand name it bore to the silly names Acorn had attached to key parts and the lack of applications software for demonstration to interested would-be users. Educational buyers were worried by the price, business buyers by the incompatibility, and only devoted hobbyists and programmers seemed to have any use for the much vaunted speed and programming power.

Over the last year Acorn has dropped the silly names. Podules have become the more sober expansion cards, and the bug-ridden Arthur's blue-suited offspring is RISC OS. Applications, produced both by names familiar in the BBC market and newcomers, have sprung up. October's Personal Computer Show alone saw a choice of four spreadsheets demonstrated for the Archimedes.

This new processing power has taken the Acorn name into new areas; the Archimedes can handle both the speed and graphics needed for applications like video subtitling, which previously required very expensive special computers.

Sales are growing. They have even exceeded those of the Master series in money terms.

The strong interest being shown abroad in the Archimedes and the potential in the technical market in Britain bodes well. The new RISC OS operating system makes the Archimedes hardware a strong competitor to the IBM PC and the Macintosh. But Acorn have to rely on other companies producing software to strengthen its hands.

This year's interim results showed that Acorn is at last back on the road to profitability. Taking this RISC seems to be about to pay off for them.

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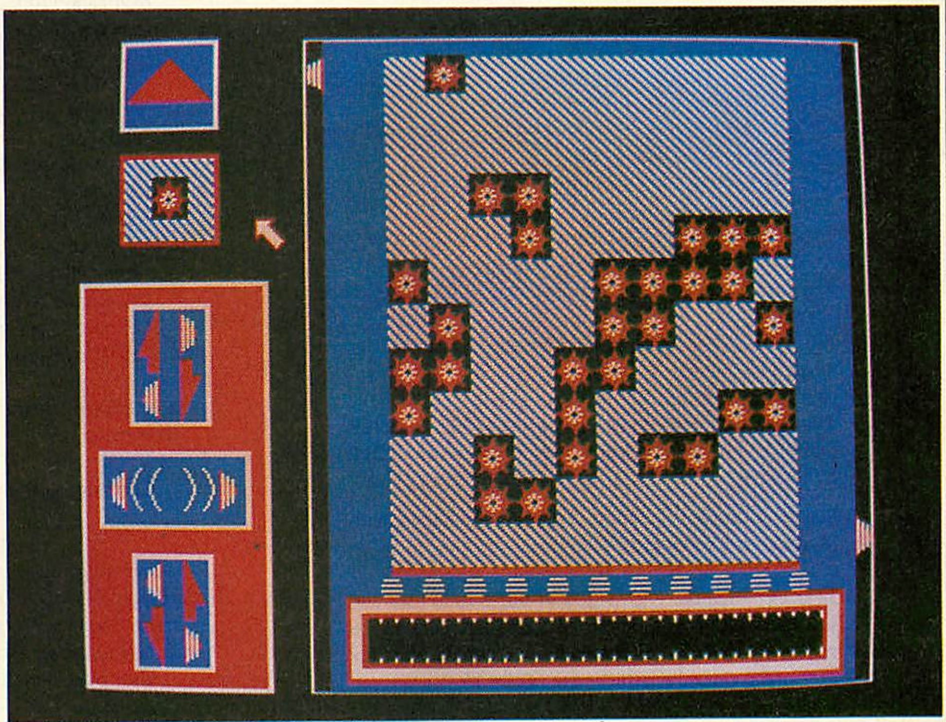
**Adventure programs can offer a wide range of opportunities in the classroom. We take a look at four of the best**

***Chris Drage and Nick Evans***

So much adventure software has been published during the past year that this month we planned to offer a pot-pourri of packages suitable for junior, middle and secondary age groups. But to do justice to all the software, this would have left us space for about three sentences per program! Instead we have chosen to discuss four adventures which we consider innovative and unique in their field.

Renowned for its quality curriculum support software, Resource continues to maintain its high standards with *Whispy Wood* and *Droom* for the Arc. *Whispy Wood* is an environmental adventure program set in an imaginary wood. The children must help Munche, a caterpillar, explore the woodland, then later survive the various predators and dangers which lurk within it. The scenario is based on real deciduous woodland, and in order to survive, the children must begin to 'think like a caterpillar' – which doesn't prove too difficult for some!

In the first part of the program, children help Munche explore his environment and become familiar with the perils which exist at each location. The documentation accompanying this program stresses that children should be given every opportunity to visit a real woodland habitat so that they get the best value from the software. Alternatively, a wide range of resources could be gathered in order to provide the necessary vicarious experience and background information. An Usbourne Spotters Guide: *Woodland Life* is included in the pack for good measure. Once the area has been mapped and the location of various flora and fauna ascertained, Munche can take the 'Test Of Fellowship' – a test of survival in the woodland. The number of locations ranges from a choice of 30 to 54 with five levels of play. At the most difficult level, Munche can be attacked by all the dangers dangers present – at easier levels, only a few dangers harm the caterpillar. Simple commands like CLIMB, SNIFF or LISTEN can be used at the appropriate time. The emphasis is on using the caterpillar's senses to make decisions relating to survival. Using simple yet very effective graphics, and a good range of teacher-controls, *Whispy Wood* offers a novel approach to environmental studies, or even to work relating to the five senses.



***World without Words*: exploration and communication without language**

Resource's bestseller to date is *Droom* (for the model B and Master 128), a mathematical adventure guaranteed to enthuse seven to 11-year-olds. A real credit to its author Derek Allen, *Droom* has now been adapted for the Archimedes as well. It is based around a story in which the Princess Arminda has been kidnapped by the dragon Droom. Meanwhile, her true love, Prince Henry, has been turned into a frog. The children must rescue the princess. The two interlocking parts to the program are the storyline, which is a rich source of inspiration for creative and expressive work, and a series of puzzles and problems. It is upon the solution to the latter that progress through the adventure depends. A pleasing feature of *Droom* is that children are never penalised for their mistakes – they aren't sent back to the beginning of the adventure to start again. Instead they are positively encouraged to try again and to succeed. A supplementary puzzle disc is provided in the package, and children are able to practise various types of problems: co-ordinates, digital roots, pelmanism, Tower of Hanoi, pattern-sequencing, binary numbers, sliding block puzzles, polygrams.

Not surprisingly, Archimedes *Droom* faithfully reproduces the BBC version but surpasses it in speed and graphic quality – it uses a 256-colour mode, and the anima-

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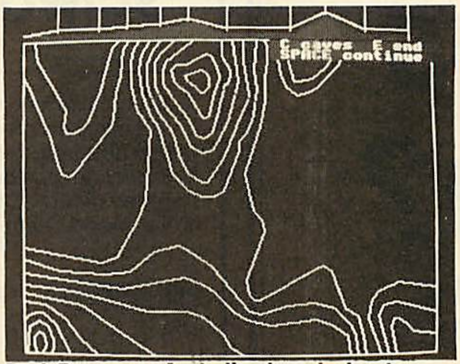
tion is very smooth. Resource provides an auto-configuration routine on its *Droom* disc which automatically resets an Arc to its original status on exit from the program – very handy, as it keeps all the 'housekeeping' activities transparent to the user. It is entirely mouse-controlled using the Archimedes' Wimp environment, providing the software with an easier method of control than its predecessor.

One criticism however, has to be over the control of the 'car' which children must 'drive' to various locations to move between parts of the program. On the Arc version, children find the car awkward to park at each house. Otherwise this is a superb program which provides us with a taste of just what this powerful computer is capable of.

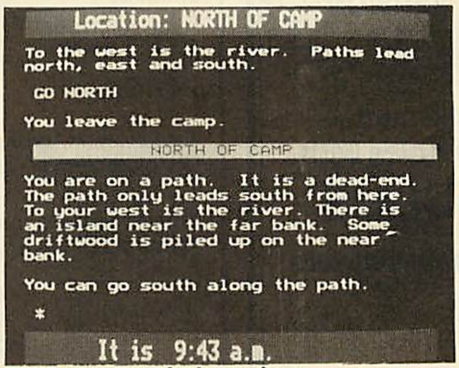
*Bush Rescue* is an adventure for the top middle school and lower secondary range. It's a departure towards reality for 4Mation which is synonymous with fantasy adventures. The rescue takes place at the fictitious Caves Bay National Park in Queensland, Australia. Groups of pupils must plan and organise a camping trip to the park. When they arrive they discover a fellow camper who tells them that one of his party is injured in one of the park's caves. The remainder of the party is scattered, and it is the group's task to locate each member of the missing group, including the injured child, and return to the park HQ. Then the pupils must direct a successful helicopter rescue.

*Bush Rescue* has four sections: planning the trip, the adventure, the helicopter rescue and the writing of a newspaper report. In the planning section the children must access a 'videotext system' called *Infotel*, in order to book the camp site and the necessary t ansport. The viewdata simulation is authentic, and the children learn that a great deal of accuracy is required to ensure the necessary transport connections are made. *Bush Rescue* is a truly cross-curricular package: studies based on viewdata systems, electronic mail, 24-hour/12-hour clock and timetables are just a few of the possible topics inspired by this comprehensive adventure at the planning stage.

Once at the park, the children are immediately thrown into the main body of the adventure: the rescue operation. This section is purely textual, and adventure-style language is employed. The colourful map that comes with the pack is needed to work out the best routes round the park. A number of problems, involving a wide range of skills and concepts must be



***Bush Rescue*: an Australian-based adventure**




**A truly cross-curricular package**

solved. These have great appeal to the target age group as they involve such things as survival equipment, bridge-building, maze and cave exploration, and finally, plotting a course for the rescue helicopter. Various information booklets and copiable record sheets are included in the pack, and they create a sense of reality. Three levels of difficulty exist, and each group may save their progress at any stage. A randomising element ensures that no two groups will experience exactly the same adventure, although the problems encountered remain the same.

To get the best from *Bush Rescue* it is advisable to create about five/six groups in the class, and to plan a variety of activities around the topic, away from the computer. The handbook describes a number of different approaches. Like many of 4Mation's previous publications, *Bush Rescue* will positively enthuse your pupils!

*World without Words* is another catalyst for investigation and imaginative work from 4Mation. Like *Bush Rescue*, it is a complete resource pack containing a picture book on communication, an hour-long tape of synthesised music, a storybook, a poster, a disc of software, a full colour manual and a set of three cards showing Braille, Moon and Manual alphabets. Unlike *Bush Rescue*, *World without Words* is pure fantasy; its theme being one of exploration and communication without language, providing starting points for a wide range of related topics. It has no words, only pictures!

An extra-terrestrial spacecraft lands in the middle of a city. It sends out signals inviting Earthlings to explore it. All exploration depends on the inquisitive nature of the child and his/her ability to solve the many problems and puzzles in various parts of the spacecraft.

The occupant of the craft can be awakened from suspended animation and sent exploring. With no words being used throughout, arrows indicate exits and puzzles contain icons and symbols. Fortunately for bewildered teachers, the excellent manual comes to the rescue.

All movement and selection is obtained with a screen pointer. While the pointer is visible, screens may be dumped to an Epson-compatible, or an Integrex 132 printer and included in the children's written work. There are no specific levels of difficulty; the teacher should only provide as much explanation as he/she thinks necessary for each group of children. The puzzles are dressed in lovely graphics and are extremely well designed. One activity, termed a 'face processor', really provides children with a reason to study one another's faces, discover facial characteristics and interpret facial expressions.

A wide variety of add-on input devices can be used: Concept Keyboard, touch-screen, joysticks, switches, mouse, tracker-ball and light pen. The various booklets enclosed offer a wealth of ideas and many avenues of exploration. The software too offers many opportunities, and children are simply fascinated by its highly original nature. *World without Words* will be welcomed by innovative teachers who believe that computer resources should inspire and foster wide-ranging interpretations.

Much of the recently published adventure software has been aimed at infant and first school children. In the next issue we will select a number of titles from the best of what is now available and suggest strategies for their integration into the infant curriculum.

Whispy Wood, £17.19 *(for the BBC B, B+, Master 128, Compact), and* Droom, £21.79 *(for the Archimedes 305,310), are available from Resource, Exeter Road, Off Coventry Grove, Doncaster DN2 4PY.* Bush Rescue, *£24.15 (£66.12 Network version), and* World without Words, *£28.78 (both for the BBC B, B+, Master 128), are available from 4Mation Educational Resources, Linden Lea, Rock Park Barnstaple, Devon EX32 9AQ.*

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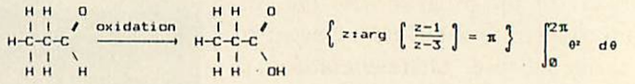
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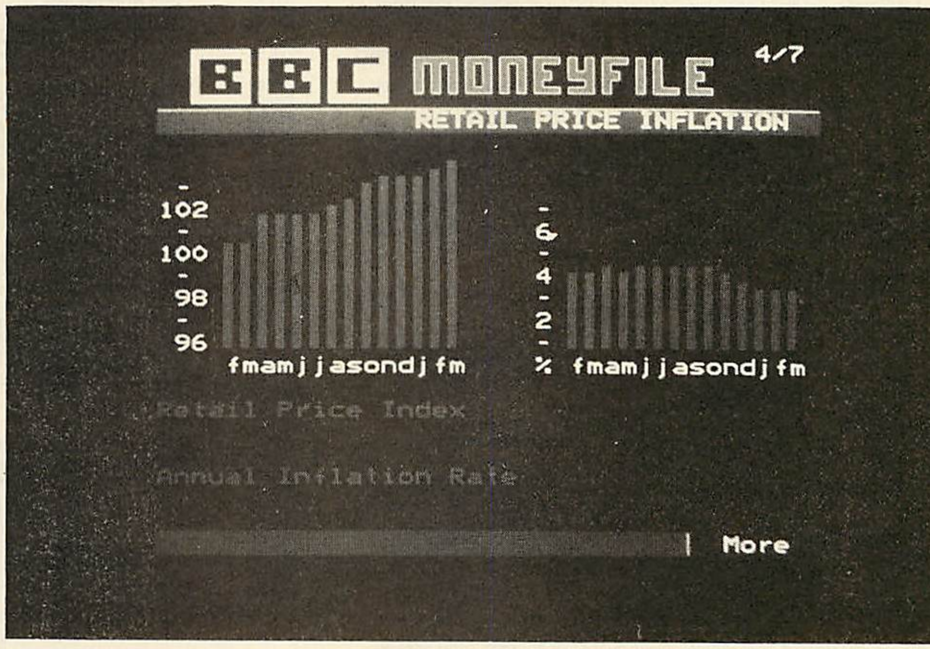
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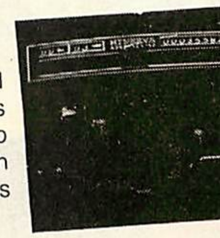
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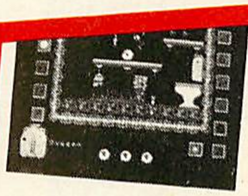


## ORION

Skillfully manipulate Orion, the latest air to air combat interceptor, to defend your planet against the tide of marauding aliens. Shoot them down before its too late! Score points by saving your men before they are changed into mutants - otherwise they will turn against you. Contains Baiters, Pods which explode into Swarmers and waves of Bombers. Orion is a fast and furious scrolling 'shoot em up' game based on the all time arcade classic.

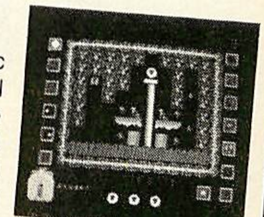


NEW



## HOVERBOD

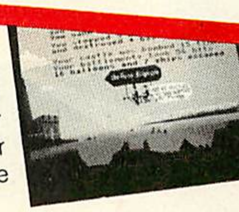
Hoverbod is a traditional maze adventure in the style of the classic Manic Miner, yet it is of stupendous proportions. Hoverbod, the yellow sperical droid, has been banished from the planet Zingle and goes in search of some stolen treasure. The player must guide him through the perils which befall him and help him puzzle his way through the eight different levels to the final quest level. But beware ... the Ibbles and Squibbles start to materialise !!!!



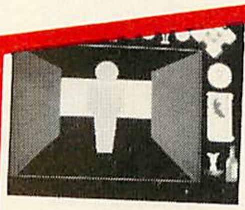


## FREDDY'S FOLLY

An enchanting game using animated graphics. Just watch the little men load the canon and pull it along. Notice the celebration when they win! Colourful fun for all the family. Sir Freddy is sneaky and envious of your castle so plans to bomb it with a fleet of balloons. You built a battlement to shoot down Sir Freddy in his balloon. Sir Freddy then hired several Gun ships to shoot your canon crew. Defend your castle and shoot down the balloons and the invading ships.

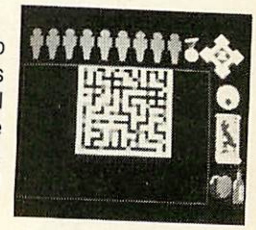


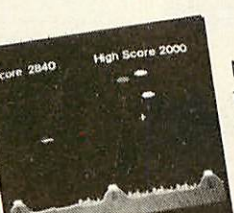
NEW



## MINOTAUR

The Minotaur maze game is aimed at a market for children or adults who want a game where quick shoot-out reactions are not necessary. Theseus walks around the Labyrinth, collecting items to assist in the search of the ill fated men which have been provided as food for the Minotaur. The ultimate aim is then to kill the Minotaur and lead the men out of the Labyrinth to safety. The maze size is fully definable by the User. Games may be saved and reloaded for use at a later time.






## MISSILE CONTROL

Missile Control is a classic arcade game written for the Archimedes to make full use of the advanced graphics and sound, while remaining faithful to the original concepts of the game. The Player is in control of the missile launches and must do the utmost to protect the cities from the incoming missiles. On each subsequent attack further planes, satellites or 'smart' missiles attack the target cities.



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# PLAY IT AGAIN SAM 5

NEW ELECTRON RELEASE

A Superior Hit




**IMOGEN**
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This superbly animated adventure game, playing the part of Imogen the wizard with powers of metamorphosis, was highly praised when recently released for the BBC Micro. It is now also available for the first time for the Electron, having been specially prepared for this compilation. Both versions combine addictive and frustrating game-play with highly detailed graphics.





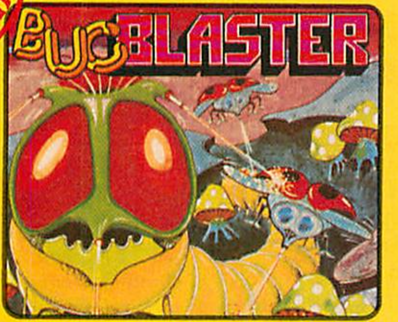

**ELIXIR**
**Superior's Humorous Strategy Game**

Help poor Cyril to return to his normal size by finding the elixir. Keep clear of the lipstick missiles, dodge the acid, and watch out for the "circulasaurus" creature.

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**BUG BLASTER**
**A Classic Hit from Alligata**

The best implementation of the "Centipede" game. (Even better than Superior's own version!) Fast-moving with very detailed graphics. Features include mushrooms, spiders and a mushroom-poisoning scorpion known as Brian. Nerve tingling excitement . . . the better you get the faster the action.



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## PLAY IT AGAIN SAM 5 for the BBC Micro and Acorn Electron

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## ACORN ELECTRON VERSION

Unfortunately it is not technically possible to produce an Acorn Electron version of FORTRESS. The four games on the Acorn Electron version of PLAY IT AGAIN SAM 5 are: IMOGEN, ELIXIR, BUG BLASTER and MOONRAIDER.

**MOONRAIDER** — A fast-moving and compulsive space spectacular from Micro Power. *"A good value game, crammed with action and needing skill to test the most ardent arcade fanatic."* . . . Electron User.

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The screen pictures show the BBC Micro versions of the games.

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# YELLOW PAGES

## COMPATIBILITY

| Program | Page | BBC B | B+/128 | Master 128 | Master Compact | Electron | Arc | 6502SP/ Turbo | ADFS | Econet | Shadow RAM | Monthly T/D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hints & Tips .. | 97 | | | | | | | | | | | |
| Listing 1 | | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ |
| Listing 2 | | ■ | ■ | | | | | ■ | ■ | ■ | ■ | ■ |
| Listing 3 | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ |
| Listing 4(1) | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ |
| Listing 5 | | | | | | ■ | | | ■ | | ■ | ■ |
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| Listings 1 | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ |
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| Listing 1(1) | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ |

Note
1. requires ADFS

## HINTS & TIPS

See Hints & Tips, page 41

**Listing 1. Colour Interrupts**

```
   10 REM Eight colour Mode 1
   20 REM by Iain Coulthard
   30 REM for B/B+/M/C
   40 REM (c) Acorn User Dec 88
   50 :
   60 MODE 1
   70 osbyte=&FFF4
   80 FOR pass=0 TO 3 STEP 3
   90 P%=&A00
  100 [OPT pass
  110 .delay
  120 EQUD &2730
  130 .cola
  140 OPT FNequb(FNc(0,0))
  150 OPT FNequb(FNc(1,1))
  160 OPT FNequb(FNc(2,2))
  170 OPT FNequb(FNc(3,3))
  180 .colb
  190 OPT FNequb(FNc(0,4))
  200 OPT FNequb(FNc(1,5))
  210 OPT FNequb(FNc(2,6))
  220 OPT FNequb(FNc(3,7))
  230 .event
  240 PHP
  250 CMP #4
  260 BNE eout
  270 PHA
  280 TXA
  290 PHA
  300 LDX #3
  310 .ecl
  320 LDA cola,X
  330 STA &FE21
  340 EOR #&10
  350 STA &FE21
  360 EOR #&40
  370 STA &FE21
  380 EOR #&10
  390 STA &FE21
  400 DEX
  410 BPL ecl
  420 LDA delay
  430 STA &FE64
  440 LDA delay+1
  450 STA &FE65
  460 LDA #&C0
  470 STA &FE6E
  480 PLA
  490 TAX
  500 PLA
  510 .eout
  520 PLP
  530 RTS
  540 .int
  550 LDA &FC
  560 PHA
  570 TXA
  580 PHA
  590 TYA
  600 PHA
  610 SEI
  620 LDA &FE6D
  630 AND #&40
  640 BEQ iout
  650 STA &FE6D
  660 LDX #3
  670 .icl
  680 LDA colb,X
  690 STA &FE21
  700 EOR #&10
  710 STA &FE21
  720 EOR #&40
  730 STA &FE21
  740 EOR #&10
  750 STA &FE21
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  790 STA &FE6E
  800 .iout
  810 PLA
  820 TAY
  830 PLA
  840 TAX
  850 PLA
  860 STA &FC
  870 JMP (oldint)
  880 .setup
  890 SEI
  900 LDA &205
  910 CMP #int DIV 256
  920 BEQ skip
  930 LDA &204
  940 STA oldint
  950 LDA &205
  960 STA oldint+1
  970 LDA #int MOD 256
  980 STA &204
  990 LDA #int DIV 256
 1000 STA &205
 1010 LDA #event MOD 256
 1020 STA &220
```

Continued ▶

**◄ Listing 1. Colour Interrupts continued**

```
1030 LDA #event DIV 256
1040 STA &221
1050 .skip
1060 CLI
1070 LDA &FE6B
1080 AND #&3F
1090 STA &FE6B
1100 LDA #189
1110 LDX #0
1120 LDY #0
1130 JSR osbyte
1140 LDA #14
1150 LDX #4
1160 JMP osbyte
1170 .oldint
1180 EQUW &FFFF
1190 ]
1200 NEXT
1210 :
1220 VDU 23,128,&FE,&FE
,&FE,&FE,&FE,&FE,&FE,0
1230 VDU 23,129,0,&FE,&
FE,&FE,&FE,&FE,&FE,&FE
1240 CALL setup
1250 CLS
1260 FOR L=100 TO 131
1270 COLOUR L MOD 4
1280 PRINT';L;STRING$(1
8,CHR$128+CHR$129);
1290 NEXT
1300 VDU 11
1310 PRINT TAB(8,10);"
8 Colours in MODE 1 ! "
1320 PRINT TAB(6,13);"
Move Boundary Up and Dow
n "
1330 PRINT TAB(5,15);"
with cursor keys or * an
d ? "
1340 L=!delay
1350 REPEAT
1360 COLOUR 1
1370 PRINT TAB(20,0);"D
elay = &";~L
1380 !delay=L
1390 IF INKEY-73 THEN L
=L-1
1400 IF INKEY-105 THEN
L=L+1
1410 IF INKEY-58 THEN L
=L-16
1420 IF INKEY-42 THEN L
=L+16
1430 UNTIL FALSE
1440 DEF FNc(x,y)=32*((
x AND 1)+2*(x AND 2)) OR
(y EOR 7)
1450 :
1460 DEF FNequb(b%)
1470 ?P%=b%
1480 P%=P%+1
1490 =pass
```

**Listing 2. Lower case commands**

```
  10 REM Lower Case BAS
IC entry
  20 REM by Iain Cowlth
ard
  30 REM for BBC B/B+ o
nly
  40 REM (c) Acorn User
 Dec 88
  50 :
  60 FOR pass=0 TO 2 ST
EP 2
  70 osbyte=&FFF4
  80 osrdrm=&FFB9
  90 wordv=&20C
 100 vec=&70
 110 owordv=&72
 120 len=&74
 130 temp=&75
 140 basic=&76
 150 P%=&900
 160 :
 170 [OPT pass
 180 .out
 190 PLA
 200 PLP
 210 RTS
 220 .nword
 230 STX vec
 240 STY vec+1
 250 STA temp
 260 JSR oword
 270 PHP
 280 PHA
 290 BCS out
 300 LDA &F4
 310 CMP basic
 320 BNE out
 330 LDA temp
 340 BNE out
 350 LDA vec
 360 CMP #&37
 370 BNE out
 380 LDA vec+1
 390 BNE out
 400 LDA &38
 410 CMP #7
 420 BNE out
 430 TXA
 440 PHA
 450 TYA
 460 PHA
 470 LDX #7
 480 .pushlp
 490 LDA &36,X
 500 PHA
 510 DEX
 520 BNE pushlp
 530 .copylp
 540 LDA &700,X
 550 JSR upper
 560 STA buf,X
 570 INX
 580 CMP #13
 590 BNE copylp
 600 LDA #buf MOD 256
 610 STA &37
 620 LDA #buf DIV 256
 630 STA &38
 640 .poke1
 650 JSR &FFFF
 660 :
 670 LDX #0
 680 LDY #0
 690 .mainlp
 700 LDA buf,Y
 710 BPL leave
 720 .poke2
 730 LDA #0
 740 STA read+1
 750 .poke3
 760 LDA #0
 770 STA read+2
 780 .findlp
 790 LDA #0
 800 STA len
 810 .read
 820 LDA &FFFF
 830 PHP
 840 JSR inctab
 850 PLP
 860 BMI newword
 870 INC len
 880 BNE read
 890 .newword
 900 JSR inctab
 910 CMP buf,Y
 920 BNE findlp
 930 .toklp
 940 LDA &700,X
 950 CMP #&2E
 960 BEQ leave
 970 JSR upper
 980 STA &700,X
 990 INX
1000 DEC len
1010 BNE toklp
1020 DEX
1030 .leave
1040 INX
1050 INY
1060 CMP #13
1070 BNE mainlp
1080 LDX #0
1090 .pulllp
1100 PLA
1110 STA &37,X
1120 INX
1130 CPX #7
1140 BNE pulllp
1150 PLA
1160 TAY
1170 PLA
1180 TAX
1190 PLA
1200 PLP
1210 RTS
1220 :
1230 .inctab
1240 INC read+1
1250 BNE P%+5
1260 INC read+2
1270 RTS
1280 .upper
1290 CMP #97
1300 BCC notlower
1310 CMP #123
1320 BCS notlower
1330 AND #&DF
1340 .notlower
1350 RTS
1360 .oword
1370 JMP (owordv)
1380 :
1390 .buf
1400 .tokaddr
1410 OPT FNequw(&88D3)
1420 OPT FNequw(&8951)
```

**Continued ►**

**◀ Listing 2. Lower case commands continued**

```
1430 .tabaddr
1440 OPT FNequw(&806D)
1450 OPT FNequw(&8071)
1460 .init
1470 LDA #&BB
1480 LDX #0
1490 LDY #&FF
1500 JSR osbyte
1510 STX basic
1520 TXA
1530 TAY
1540 LDA #8
1550 STA &F6
1560 LDA #&80
1570 STA &F7
1580 JSR osrdrm
1590 ASL A
1600 TAX
1610 LDA tokaddr,X
1620 STA poke1+1
1630 LDA tokaddr+1,X
1640 STA poke1+2
1650 LDA tabaddr,X
1660 STA poke2+1
1670 LDA tabaddr+1,X
1680 STA poke3+1
1690 LDA wordv+1
1700 BPL done
1710 STA owordv+1
1720 LDA wordv
1730 STA owordv
1740 LDA #nword MOD 256
1750 STA wordv
1760 LDA #nword DIV 256
1770 STA wordv+1
1780 .done
1790 RTS
1800 ]
1810 NEXT
1820 :
1830 PRINT "Code Assembled"
1840 A$=" *SAVE NoCase 900 "+STR$~(P%)+" "+STR$~(init)
1850 REPEAT
1860 PRINT "Press I to install, S to save"
1870 A=GET AND &DF
1880 UNTIL A=ASC"S" OR A=ASC"I"
1890 IF A=ASC"I" THEN CALL init:END
1900 PRINT A$
1910 PROCoscli(A$)
1920 END
1930 :
1940 DEF FNequw(b%)
1950 ?P%=b% MOD 256
1960 P%?1=b% DIV 256
1970 P%=P%+2
1980 =pass
1990 :
2000 DEF PROCoscli($&700)
2010 LOCAL X%,Y%
2020 Y%=7
2030 CALL &FFF7
2040 ENDPROC
```

**Listing 3. PrtSc amendments**

```
1081 LDY #3
1082 JSR rvstest
1083 LDA #135
1084 JSR osbyte
1085 TXA:PHA
1086 LDY #7
1087 JSR rvstest
1088 PLA
1089 BNE loop1
1601 .rvstest
1602 LDX #4
1603 .rvsloop
1604 LDA rvsdata,Y
1605 JSR oswrch
1606 DEY
1607 DEX
1608 BNE rvsloop
1609 RTS
1781 .rvsdata
1782 EQUD &11001187
1783 EQUD &11071180
1820 PROCchecksum(&900,end-1,&8FF5)
```

**Listing 4. ADFS File Wipe**

```
10 REM ADFS Wipe
20 REM by David Atherton
30 REM for B/B+/E/M/C with ADFS
40 REM (c) Acorn User Dec 88
50 :
60 del%=0
70 DIM B% &10,D% &10,R% 3
80 B%!9=0
90 INPUT "WIPE filespec : " F$
100 IF INSTR(F$,"*") THEN wild%=TRUE ELSE wild%=FALSE
110 PROCrem
120 REPEAT
130 A$=FNnextfile
140 IF A$="" GOTO 180
150 A$=FNuc(A$)
160 IF wild% THEN yes%=INSTR(A$,F$) ELSE yes%=(F$=A$)
170 IF yes% OR F$="" THEN PROCwipe(A$)
180 UNTIL A$=""
190 PRINT';del%;" file(s) wiped"
200 END
210 :
220 DEF FNnextfile
230 ?B%=0
240 B%!1=D%
250 B%!5=1
260 X%=B%
270 Y%=B% DIV &100
280 A%=8
290 !R%=USR &FFD1
300 IF R%!3 AND 1 THEN =""
310 L%=?B%!1
320 ?(B%!1+L%)=13
330 =$(B%!1+1)
340 :
350 DEF PROCrem
360 G$=""
370 FOR I%=1 TO LEN F$
380 char%=ASC MID$(F$,I%,1)
390 IF char%<>42 THEN G$=G$+CHR$ char%
400 NEXT
410 F$=FNuc(G$)
420 ENDPROC
430 :
440 DEF FNuc(C$)
450 LOCAL I%,B$,char%
460 FOR I%=1 TO LEN C$
470 char%=ASC MID$(C$,I%,1)
480 IF char%<33 OR char%>126 GOTO510
490 IF char%>64 AND char%<123 THEN char%=char% AND &DF
500 B$=B$+CHR$ char%
510 NEXT
520 =B$
530 :
540 DEF PROCwipe(A$)
550 PRINT A$;TAB(12);":";
560 REPEAT
570 G=GET AND &DF
580 UNTIL G=78 OR G=89
590 IF G=89 THEN PROCoscli("DELETE "+A$):VDU 89:del%=del%+1 ELSE VDU 78
600 PRINT
610 ENDPROC
620 :
630 DEF PROCoscli($&700)
640 LOCAL X%,Y%
650 Y%=7
660 CALL &FFF7
670 ENDPROC
```

**Listing 5. Electron Numeric keypad**

```
   10 REM Electron Numer
ic Keypad
   20 REM by Ian Bradley
   30 REM for Electron
   40 REM (c) Acorn User
 Dec 88
   50 :
   60 oldvector=?&211*&1
00+?&210
   70 PROCassemble
   80 PROCdefaults
   90 PROCnumeric
  100 A$="*SAVE KEYPAD 9
00+"+STR$~(end-&900)
  110 PRINT"Press I to i
nitialise, S to SAVE cod
e"
  120 REPEAT
  130 A=GET AND &DF
  140 UNTIL A=ASC"S" OR
A=ASC"I"
  150 IF A=ASC"I" THEN C
ALL code:END
  160 PRINT A$
  170 OSCLI A$
  180 END
  190 :
  200 DEF PROCassemble
  210 DIM block 3
  220 code=&900
  230 rdvector=&210
  240 FOR pass=0 TO 3 ST
EP 3
  250 P%=code
  260 [OPT pass
  270 .init
  280 LDX #keyrtn AND &F
F
  290 LDY #keyrtn DIV &1
00
  300 SEI
  310 STX rdvector
  320 STY rdvector+1
  330 CLI
  340 RTS
  350 .keyrtn
  360 JSR oldvector
  370 PHP
  380 STA char
  390 TYA
  400 PHA
  410 TXA
  420 PHA
  430 LDY char
  440 BEQ zero
  450 CPY #127
  460 BPL fin
  470 LDX flag
  480 BEQ fin
  490 LDA table,Y
  500 STA char
  510 JMP fin
  520 .zero
  530 LDA #1
  540 EOR flag
  550 STA flag
  560 .fin
  570 PLA
  580 TAX
  590 PLA
  600 TAY
  610 LDA char
  620 PLP
  630 RTS
  640 .flag
  650 EQUB 0
  660 .char
  670 EQUB 0
  680 .table
  690 EQUS STRING$(128,"
")
  700 .end
  710 ]
  720 NEXT pass
  730 ENDPROC
  740 :
  750 DEF PROCdefaults
  760 FOR a%=0 TO 128
  770 table?a%=a%
  780 NEXT a%
  790 ENDPROC
  800 :
  810 DEF PROCnumeric
  820 DATA M,0,J,1,K,2,L
,3,U,4,I,5,O,6
  830 RESTORE 820
  840 FOR t%=1 TO 7
  850 READ o$,n$
  860 table?ASC(o$)=ASC(
n$)
  870 NEXT
  880 ENDPROC
```

**See Arc Agora, page 46**

**Listing 1. PrintFix Module**

```
   10 REM Arc Agora - li
sting 1
   20 REM PrintFix
   30 REM by J A Briant
   40 REM for Archimedes
 only
   50 REM (c) Acorn User
 December 1988
   60 :
   70 DIM code% 1024
   80 :
   90 FOR opt%=4 TO 7 ST
EP 3
  100 P%=0
  110 O%=code%
  120 [OPT opt%
  130 EQUD 0
  140 EQUD 0
  150 EQUD final
  160 EQUD 0
  170 EQUD title
  180 EQUD help
  190 EQUD comtable
  200 .title
  210 EQUS "PrinterFix"
  220 EQUB 0
  230 ALIGN
  240 .help
  250 EQUS "Printer Fix"
+CHR$(9)+"1.00 (18 Aug 1
988)"
  260 EQUB 0
  270 ALIGN
  280 .comtable
  290 EQUS "PFix"
  300 EQUB 0
  310 ALIGN
  320 EQUD fixcode
  330 EQUD &00FF0000
  340 EQUD fixsyntax
  350 EQUD fixhelp
  360 EQUS "Strip"
  370 EQUB 0
  380 ALIGN
  390 EQUD stripcode
  400 EQUD &00020001
  410 EQUD stripsyntax
  420 EQUD striphelp
  430 EQUD 0
  440 .final
  450 STMFD R13!,{R14}
  460 BL printoff
  470 B frelease
  480 .fixcode
  490 STMFD R13!,{R14}
  500 STMFD R13!,{R0}
  510 BL printon
  520 BL claim
  530 LDMFD R13!,{R0}
  540 SWI "OS_CLI"
  550 BL printoff
  560 B frelease
  570 .writecintercept
  580 TST R0,#&80
  590 MOVNE R0,#ASC(".")
  600 MOV PC,R14
  610 .fixhelp
  620 EQUS "PFix <comman
d> performs *command sen
ding all output to the p
rinter, but stripping to
p-bit-set characters"
  630 EQUB 13
  640 .fixsyntax
  650 EQUS "Syntax: PFix
 <command>"
  660 EQUB 0
  670 ALIGN
  680 .printon
  690 STMFD R13!,{R14}
  700 MOV R0,#3
  710 MOV R1,#8
  720 SWI "OS_Byte"
  730 LDMFD R13!,{PC}
  740 .printoff
  750 STMFD R13!,{R14}
  760 MOV R0,#3
  770 MOV R1,#0
  780 SWI "OS_Byte"
  790 LDMFD R13!,{PC}
  800 .claim
  810 STMFD R13!,{R14}
  820 .fclaim
  830 MOV R0,#3
  840 ADR R1,writecinter
cept
  850 MOV R2,#0
  860 SWI "OS_Claim"
  870 LDMFD R13!,{PC}
  880 .release
  890 STMFD R13!,{R14}
  900 .frelease
  910 MOV R0,#3
  920 ADR R1,writecinter
cept
  930 MOV R2,#0
  940 SWI "XOS_Release"
  950 LDMFD R13!,{PC}^
```

**Continued ►**

**◄ Listing 1. Printfix Module continued**

```
960 .stripcode
970 STMFD R13!,{R14}
980 STR R0,tail
990 ADR R1,stp
1000 MOV R2,#0
1010 BL instr
1020 STR R2,setp
1030 LDR R0,tail
1040 ADR R1,ston
1050 MOV R2,#0
1060 BL instr
1070 TST R2,#1<<31
1080 BEQ stripon
1090 LDR R0,tail
1100 ADR R1,stoff
1110 MOV R2,#0
1120 TST R2,#1<<31
1130 BEQ stripoff
1140 ADR R0,striperr
1150 TEQP R15,#&10000003
1160 LDMFD R13!,{PC}
1170 .instr
1180 ADD R2,R2,R0
1190 .stlop1
1200 MOV R3,R2
1210 LDRB R5,[R3],#1
1220 MOV R4,R1
1230 .stlop2
1240 LDRB R6,[R4],#1
1250 TEQ R6,#0
1260 SUBEQ R2,R2,R0
1270 MOVEQ PC,R14
1280 TEQ R5,#0
1290 MOVEQ R2,#1<<31
1300 MOVEQ PC,R14
1310 TEQ R6,R5
1320 ADDNE R2,R2,#1
1330 BNE stlop1
1340 LDRB R5,[R3],#1
1350 B stlop2
1360 .stripon
1370 LDR R0,setp
1380 TST R0,#1<<31
1390 BLEQ printon
1400 B fclaim
1410 .stripoff
1420 LDR R0,setp
1430 TST R0,#1<<31
1440 BLEQ printoff
1450 B frelease
1460 .striperr
1470 EQUD &DC
1480 .striphelp
1490 EQUS "Strip ON/OFF removes MSB-set from the output stream. 'P' option also sets the state of the printer."
1500 EQUB 13
1510 .stripsyntax
1520 EQUS "Syntax: Strip <ON/OFF> [<P>]"
1530 EQUB 0
1540 ALIGN
1550 .tail
1560 EQUD 0
1570 .setp
1580 EQUD 0
1590 .stp
1600 EQUS "P"
1610 EQUB 0
1620 ALIGN
1630 .ston
1640 EQUS "ON"
1650 EQUB 0
1660 ALIGN
1670 .stoff
1680 EQUS "OFF"
1690 EQUB 0
1700 ALIGN
1710 .end
1720 ]
1730 NEXT
1740 :
1750 OSCLI("SAVE PfixMod "+STR$~code%+" +"+STR$~end)
1760 *SETTYPE PfixMod FFA
1770 *RMLOAD PfixMod
1780 END
```

**Listing 2. Podule Loader**

```
10 REM Arc Agora - listing 2
20 REM PodImSrce
30 REM by Andy Armstrong
40 REM for Archimedes only
50 REM (c) Acorn User December 1988
60 :
70 MODE 0
80 tab=9
90 lf=10
100 cr=13
110 slot0=&3240000
120 vbit=1<<28
130 country=0
140 manufacturer=0
150 prodtype=0
160 pageregister=&2000
170 codesize=&3FFF
180 DIM code codesize
190 FOR pass%=0 TO 2 STEP 2
200 P%=code
210 [OPT pass%
220 .modulebase
230 EQUB %00000000
240 EQUB %00000011
250 EQUB %00000000
260 EQUW prodtype
270 EQUW manufacturer
280 EQUB country
290 EQUD 0
300 EQUD 0
310 FNchunk(%10000000,loader,loaderend,FALSE)
320 FNstrchunk(2,manufdate,manufdateend,FALSE)
330 FNstrchunk(5,description,descend,FALSE)
340 EQUD 0
350 :
360 .manufdate
370 EQUS FNz("21 Sep 1988")
380 ALIGN
390 .manufdateend
400 :
410 .description
420 EQUS FNz("Any old thing")
430 ALIGN
440 .descend
450 :
460 .loader
470 B readabyte
480 BICS pc,r14,#vbit
490 B reset
500 B identify
510 .identify
520 MOV r0,#manufacturer
530 ORR r0,r0,#prodtype << 16
540 MOV r2,r11
550 BICS pc,r14,#vbit
560 .addrmask
570 EQUD &3FFF000
580 .reset
590 LDR r3,addrmask
600 AND r3,r3,r11
610 ADD r3,r3,#pageregister
620 MOV r2,#0
630 STRB r2,[r12]
640 BICS pc,r14,#vbit
650 .readabyte
660 ADD r1,r1,#codespace-modulebase
670 LDR r3,addrmask
680 AND r3,r3,r11
690 ADD r10,r3,#pageregister
700 MOV r2,#%00000111
710 AND r2,r2,r1,LSR #11
720 STRB r2,[r10,#0]
730 BIC r2,r1,#%111111100000000000
740 LDRB r0,[r3,r2,LSL #2]
750 SUB r1,r1,#codespace-modulebase
760 BICS pc,r14,#vbit
770 .loaderend
780 :
790 .codespace
800 FNchunk(%10000001,userrm,userrmend,TRUE)
810 EQUD 0
820 ALIGN
830 :
840 .userrm
850 FNgetfile("PfixMod")
860 ALIGN
870 .userrmend
880 :
890 .moduleend
900 :
910 .ramaddr
920 EQUD slot0
930 .codestart
940 EQUD modulebase
950 .codeend
960 EQUD moduleend
```

Continued ►

◀ **Listing 2. Podule loader continued**

```
970 ]
980 NEXT
990 IF P%>code+codesiz
e THEN ERROR 0,"Code too
big"
1000 OSCLI "Save PodIm
"+STR$~modulebase+" "+ST
R$~moduleend
1010 PRINT"Podule image
saved as 'PodIm'."
1020 END
1030 :
1040 DEF FNz(data$)=dat
a$+CHR$(0)
1050 :
1060 DEF FNchunk(type%,
start%,end%,cs%)
1070 IF cs% THEN base%=
codespace ELSE base%=mod
ulebase
1080 size%=end%-start%
1090 [OPT pass%
1100 EQUB type%
1110 EQUB size% AND &0F
F
1120 EQUW size% DIV &10
0
1130 EQUD start%-base%
1140 ]
1150 =0
1160 :
1170 DEF FNstrchunk(typ
e%,start%,end%,cs%)
1180 =FNchunk(type% OR
%11110000,start%,end%,cs
%)
1190 :
1200 DEF FNgetfile(fsp$
)
1210 LOCAL in%,fsize%
1220 in%=OPENIN(fsp$)
1230 IF in%=0 THEN ERRO
R 0,"Can't find "+fsp$
1240 fsize%=EXT#in%
1250 CLOSE#in%
1260 OSCLI "Load "+fsp$
+" "+STR$~P%
1270 P%+=fsize%
1280 =0
```

**Listing 3. Quicksort**

```
10 REM Arc Agora - listing 3
20 REM ARM Quicksort
30 REM by Ferdinand Oeinck
40 REM for Acrhimedes only
50 REM (c) Acorn User December 1988
60 :
70 MODE 0
80 PROCass
90 PRINT "ARM quicksort by Ferdinand
Oeinck"
100 INPUT '"How many numbers to sort?
"N%
110 DIM a% N%*4
120 PRINT '"Initialising array of rand
om numbers..."
130 FOR I%=1 TO N%
140 a%!(I%*4)=RND(100000)
150 NEXT
160 A%=a%
170 B%=1
180 C%=N%
190 PRINT '"Sorting now..."
200 TIME=0
210 CALL qsort
220 PRINT '"Time taken to sort ";N%;"
integers is ";TIME/100" secs."
230 PRINT '"Press a key to see the res
ult..."
240 key=GET
250 FOR I%=1 TO N%
260 PRINT a%!(I%*4),;
270 NEXT
280 PRINT
290 END
300 :
310 DEF PROCass
320 DIM c% 500
330 pointer=0:left=1:right=2:i=3
340 last=4:temp1=5:temp2=6:temp3=7
350 sp=13:link=14:pc=15
360 FOR pass%=0 TO 2 STEP 2
370 P%=c%
380 [OPT pass%
390 .qsort
400 STMFD (sp)!,{left,right,last,link}
410 CMP left,right
420 LDMGEFD (sp)!,{left,right,last,pc}
430 LDR temp1,[pointer,left,LSL #2]
440 ADD temp3,left,right
450 MOV temp3,temp3,LSR #1
460 LDR temp2,[pointer,temp3,LSL #2]
470 STR temp2,[pointer,left,LSL #2]
480 STR temp1,[pointer,temp3,LSL #2]
490 MOV last,left
500 ADD i,left,#1
510 .loop
520 LDR temp1,[pointer,i,LSL #2]
530 LDR temp2,[pointer,left,LSL #2]
540 CMP temp1,temp2
550 BGE greaterorequal
560 ADD last,last,#1
570 LDR temp1,[pointer,last,LSL #2]
580 LDR temp2,[pointer,i,LSL #2]
590 STR temp2,[pointer,last,LSL #2]
600 STR temp1,[pointer,i,LSL #2]
610 .greaterorequal
620 ADD i,i,#1
630 CMP i,right
640 BLE loop
650 LDR temp1,[pointer,left,LSL #2]
660 LDR temp2,[pointer,last,LSL #2]
670 STR temp2,[pointer,left,LSL #2]
680 STR temp1,[pointer,last,LSL #2]
690 STMFD (sp)!,{right}
700 SUB R2,last,#1
710 BL qsort
720 LDMFD (sp)!,{right}
730 ADD r1,last,#1
740 BL qsort
750 LDMFD (sp)!,{left,right,last,pc}
760 ]
770 NEXT pass%
780 ENDPROC
```

## December listings

*We would like to apologise that due to limited space, the second GKS demo, and the AMPLE music listing have had to be left out of the yellow pages. They can of course be obtained from the monthly disc, or, by sending an SAE (marked either 'GKS' or 'AMPLE') to AU, 20-26 Brunswick Place, London, N1 6DJ.*

*Due to Micronet's abandonment of paid-for downloadable software, the listings will not be available on Micronet as they have been in the past.*

See The Heart of Art, page 66

**Listing 1. GKS demonstration**

```
   10 REM >GKS_DEMO_1
   20 REM by G Martin & G Phil
lips
   30 REM for Archimedes only
   40 REM (c) Acorn User Decem
eber 1988
   50 :
   60 LIBRARY "GKS_LIB"
   70 :
   80 PROCopen_gks(1)
   90 PROCopen_workstation(1,1
,12)
  100 PROCactivate_workstation
(1)
  110 :
  120 GKS_NORMALIZATION=1
  130 TEXT_NORMALIZATION=2
  140 :
  150 gn=FNvertex_max("G")
  160 DIM gx(gn),gy(gn)
  170 kn=FNvertex_max("K")
  180 DIM kx(kn),ky(kn)
  190 sn=FNvertex_max("S")
  200 DIM sx(sn),sy(sn)
  210 rhn=FNvertex_max("rhombu
s")
  220 DIM rx(rhn),ry(rhn)
  230 sqn=FNvertex_max("square
")
  240 DIM sqx(sqn),sqy(sqn)
  250 :
  260 PROCset_polyline("G",gx(
),gy())
  270 PROCset_polyline("K",kx(
),ky())
  280 PROCset_polyline("S",sx(
),sy())
  290 PROCset_polyline("rhombu
s",rx(),ry())
  300 PROCset_polyline("square
",sqx(),sqy())
  310 :
  320 PROCset_normalization_tr
ansformation("text",TEXT_NORMA
LIZATION)
  330 PROCset_normalization_tr
ansformation("GKS",GKS_NORMALI
ZATION)
  340 :
  350 PROCselect_normalization
_transformation(0)
  360 PROCset_polyline_index(2
)
  370 PROCpolyline(rhn,rx(),ry
())
  380 PROCset_polyline_index(1
)
  390 PROCpolyline(sqn,sqx(),s
qy())
  400 :
  410 PROCselect_normalization
_transformation(GKS_NORMALIZAT
ION)
  420 PROCset_asf_individual(A
SF_POLYLINE_LINETYPE)
  430 PROCset_linetype(1)
  440 PROCpolyline(gn,gx(),gy(
))
  450 PROCset_linetype(2)
  460 PROCpolyline(kn,kx(),ky(
))
  470 PROCset_linetype(3)
  480 PROCpolyline(sn,sx(),sy(
))
  490 :
  500 PROCselect_normalization
_transformation(TEXT_NORMALIZA
TION)
  510 PROCset_asf_individual(A
SF_TEXT_FONT_AND_PRECISION)
  520 PROCset_asf_individual(A
SF_TEXT_COLOUR_INDEX)
  530 PROCset_text_colour_inde
x(3)
  540 PROCset_character_height
(20)
  550 PROCset_text_font_and_pr
ecision(1,CHARACTER)
  560 PROCtext(240,295,"Archim
edes GKS")
  570 PROCset_character_height
(16)
  580 PROCset_text_font_and_pr
ecision(1,STROKE)
  590 PROCset_text_colour_inde
x(5)
  600 PROCtext(265,265,"Archim
edes GKS")
  610 :
  620 PROCdeactivate_workstati
on(1)
  630 PROCclose_workstation(1)
  640 PROCclose_gks
  650 END
  660 :
  670 DATA .G
  680 DATA 21
  690 DATA 220,250,260,260,240
,240
  700 DATA 250,250,240,230,220
,220
  710 DATA 230,240,250,260,250
,220
  720 DATA 210,210,220
  730 :
  740 DATA 120,120,130,160,160
,150
  750 DATA 150,140,130,130,140
,170
  760 DATA 180,180,170,180,190
,190
  770 DATA 180,130,120
  780 :
  790 DATA .K
  800 DATA 12
  810 DATA 270,280,280,310,320
,295
  820 DATA 320,310,280,280,270
,270
  830 :
  840 DATA 120,120,150,120,130
,155
  850 DATA 180,190,160,190,190
,120
  860 :
  870 DATA .S
  880 DATA 23
  890 DATA 340,370,380,380,370
,350
  900 DATA 340,350,360,370,380
,370
  910 DATA 340,330,330,340,360
,370
  920 DATA 360,350,340,330,340
  930 :
  940 DATA 120,120,130,150,160
,160
  950 DATA 170,180,180,170,180
,190
  960 DATA 190,180,160,150,150
,140
  970 DATA 130,130,140,130,120
  980 :
  990 DATA .GKS
 1000 DATA 0.3,0.7,0.3,0.7
 1010 DATA 200,400,0,200
 1020 :
 1030 DATA .text
 1040 DATA 0,1,0,1
 1050 DATA 0,750,0,750
 1060 :
 1070 DATA .rhombus
 1080 DATA 5
 1090 DATA 0.5,0.9,0.5,0.1,0.5
 1100 :
 1110 DATA 0.1,0.5,0.9,0.5,0.1
 1120 :
 1130 DATA .square
 1140 DATA 5
 1150 DATA 0.3,0.7,0.7,0.3,0.3
 1160 DATA 0.3,0.3,0.7,0.7,0.3
 1170 :
 1180 DATA .characters
 1190 DATA 2,0,2,4
 1200 DATA 2,4,5,10
 1210 DATA 5,10,8,4
 1220 DATA 8,4,8,0
 1230 DATA 2,4,8,4
 1240 DATA 0,0,0,0
 1250 :
 1260 DEF PROCframe(name$,tran
s_num)
 1270 PROCrestore(name$)
 1280 READ x_min,x_max,y_min,y
_max
 1290 PROCset_viewport(trans_n
um,x_min,x_max,y_min,y_max)
 1300 READ x_min,x_max,y_min,y
_max
 1310 PROCset_window(trans_num
,x_min,x_max,y_min,y_max)
 1320 PROCselect_normalization
_transformation(trans_num)
 1330 PROCbox(x_min,x_max,y_mi
n,y_max)
 1340 ENDPROC
 1350 :
 1360 DEF PROCset_normalizatio
n_transformation(name$,trans_n
um)
 1370 PROCrestore(name$)
 1380 READ x_min,x_max,y_min,y
_max
 1390 PROCset_viewport(trans_n
um,x_min,x_max,y_min,y_max)
 1400 READ x_min,x_max,y_min,y
_max
 1410 PROCset_window(trans_num
,x_min,x_max,y_min,y_max)
 1420 ENDPROC
 1430 :
 1440 DEF FNvertex_max(name$)
 1450 LOCAL n
 1460 PROCrestore(name$)
 1470 READ n
 1480 =n
 1490 :
 1500 DEF PROCset_polyline(nam
e$,x(),y())
 1510 LOCAL i,n
 1520 PROCrestore(name$)
 1530 READ n
 1540 FOR i=1 TO n
 1550 READ x(i)
 1560 NEXT
 1570 FOR i=1 TO n
 1580 READ y(i)
 1590 NEXT
 1600 ENDPROC
 1610 :
 1620 DEF PROCbox(xmin,xmax,ym
in,ymax)
 1630 LOCAL box_x(),box_y():DI
M box_x(5),box_y(5)
 1640 PROCset_polyline_index(1
)
 1650 box_x(1)=xmin:box_y(1)=y
min
 1660 box_x(2)=xmin:box_y(2)=y
max
 1670 box_x(3)=xmax:box_y(3)=y
max
 1680 box_x(4)=xmax:box_y(4)=y
min
 1690 box_x(5)=xmin:box_y(5)=y
min
 1700 PROCpolyline(5,box_x(),b
ox_y())
 1710 ENDPROC
```

**Listing 2. GKS Library**

```
10 REM >GKS_LIB
20 REM by G Martin & G Phillips
30 REM for Archimedes
40 REM (c) Acorn User December 1988
50 :
60 DEF PROCset_polyline_index(li)
70 line_index=li
80 ENDPROC
90 :
100 DEF PROCset_linetype(ltype)
110 polyline_linetype=ltype
120 ENDPROC
130 :
140 DEF PROCset_polyline_colour_index(coli)
150 polyline_colour_index=coli
160 ENDPROC
170 :
180 DEF PROCinitialise_bundles(wtype)
190 LOCAL i
200 FOR i=ASF_POLYLINE_LINETYPE TO ASF_TEXT_CHARACTER_SPACING
210 aspect_source_flags(i)=BUNDLED
220 NEXT
230 :
240 PROCset_polyline_colour_index(1)
250 PROCset_linetype(solid)
260 PROCset_polyline_index(1)
270 PROCset_polymarker_index(1)
280 PROCset_polymarker_colour_index(1)
290 PROCset_marker_size_scale_factor(1)
300 PROCset_text_index(1)
310 :
320 CASE wtype OF
330 WHEN 0,4:
340 PROCset_colour_representation(0,0,0,0,0)
350 PROCset_colour_representation(0,1,1,1,1)
360 PROCset_polyline_representation(0,1,solid,1,1)
370 PROCset_polyline_representation(0,2,dotted,1,1)
380 PROCset_polyline_representation(0,3,dashed,1,1)
390 PROCset_polyline_representation(0,4,dot_dashed,1,1)
400 PROCset_polyline_representation(0,5,heavy_dot,1,1)
410 :
420 WHEN 1,5,8:
430 PROCset_colour_representation(0,0,0,0,0)
440 PROCset_colour_representation(0,1,1,1,1)
450 PROCset_colour_representation(0,2,0,1,0)
460 PROCset_colour_representation(0,3,0,0,1)
470 PROCset_polyline_representation(0,1,solid,1,1)
480 PROCset_polyline_representation(0,2,solid,1,2)
490 PROCset_polyline_representation(0,3,solid,1,3)
500 PROCset_polyline_representation(0,4,dotted,1,1)
510 PROCset_polyline_representation(0,5,dotted,1,2)
520 :
530 WHEN 2,9,12:
540 PROCset_colour_representation(0,0,0,0,0)
550 PROCset_colour_representation(0,1,1,1,1)
560 PROCset_colour_representation(0,2,0,1,0)
570 PROCset_colour_representation(0,3,0,0,1)
580 PROCset_colour_representation(0,4,1,0,0)
590 PROCset_colour_representation(0,5,0,1,1)
600 PROCset_polyline_representation(0,1,solid,1,1)
610 PROCset_polyline_representation(0,2,solid,1,2)
620 PROCset_polyline_representation(0,3,solid,1,3)
630 PROCset_polyline_representation(0,4,solid,1,4)
640 PROCset_polyline_representation(0,5,solid,1,5)
650 :
660 WHEN 10,13,15:
670 PROCset_colour_representation(0,0,0,0,0)
680 PROCset_colour_representation(0,1,1,1,1)
690 PROCset_colour_representation(0,2,0,1,0)
700 PROCset_colour_representation(0,3,0,0,1)
710 PROCset_colour_representation(0,4,1,0,0)
720 PROCset_colour_representation(0,5,0,1,1)
730 PROCset_polyline_representation(0,1,solid,1,1)
740 PROCset_polyline_representation(0,2,solid,1,2)
750 PROCset_polyline_representation(0,3,solid,1,3)
760 PROCset_polyline_representation(0,4,solid,1,4)
770 PROCset_polyline_representation(0,5,solid,1,5)
780 :
790 OTHERWISE:
800 PROCgks_error("Unsupported workstation type")
810 ENDCASE
820 :
830 TEXT_OFFSET_Y=32
840 PROCset_text_representation(0,1,1,STRING,1,0,1)
850 PROCset_text_representation(0,2,1,CHARACTER,1,0,1)
860 PROCset_text_representation(0,3,1,STROKE,1,0,1)
870 PROCset_polymarker_representation(0,1,DOT,1,1)
880 PROCset_polymarker_representation(0,2,STAR,1,1)
890 PROCset_polymarker_representation(0,3,CROSS,1,1)
900 PROCset_polymarker_representation(0,4,ROUND,1,1)
910 PROCset_polymarker_representation(0,5,PLUS,1,1)
920 ENDPROC
930 :
940 DEF PROCset_colour_representation(wkid,ci,cr,cg,cb)
950 COLOUR ci,255*cr,255*cg,255*cb
960 ENDPROC
970 :
980 DEF PROCset_aspect_source_flags(lasf())
990 aspect_source_flags()=lasf()
1000 ENDPROC
1010 :
1020 DEF PROCset_asf_individual(attribute)
1030 aspect_source_flags(attribute)=INDIVIDUAL
1040 ENDPROC
1050 :
1060 DEF PROCset_asf_bundled(attribute)
1070 aspect_source_flags(attribute)=BUNDLED
1080 ENDPROC
1090 :
1100 DEF PROCset_polyline_representation(wkid,pli,ltype,lwidth,coli)
1110 line_bundle(pli,POLYLINE_LINETYPE)=ltype
1120 line_bundle(pli,POLYLINE_COLOUR_INDEX)=coli
1130 ENDPROC
1140 :
1150 DEF PROCset_polymarker_representation(wkid,pmi,mtype,mszsf,coli)
1160 marker_bundle(pmi,MARKER_TYPE)=mtype
1170 marker_bundle(pmi,MARKER_COLOUR_INDEX)=coli
1180 marker_bundle(pmi,MARKER_SIZE_SCALE_FACTOR)=mszsf
1190 ENDPROC
1200 :
1210 DEF PROCclear_viewport
1220 CASE clipping_indicator OF
1230 WHEN CLIP:
1240 CLG
1250 WHEN NOCLIP:
1260 VDU 24,_xv_min;_yv_min;_xv_max;_yv_max;
1270 CLG
1280 VDU 24,0;0;1.0*DEVICE_X_SCALE;1.0*DEVICE_Y_SCALE;
1290 ENDCASE
1300 ENDPROC
1310 :
1320 DEF PROCpolyline(n,px(),py())
1330 LOCAL i,plot_code
1340 IF (n=1) THEN
1350 POINT FNmap_x(px(1)),FNmap_y(py(1))
1360 ELSE
1370 plot_code=FNpolyline_plot_code
1380 i=1
1390 WHILE (i<n)
1400 MOVE FNmap_x(px(i)),FNmap_y(py(i))
1410 PLOT plot_code,FNmap_x(px(i+1)),FNmap_y(py(i+1))
1420 i+=1
1430 ENDWHILE
1440 ENDIF
1450 ENDPROC
1460 :
1470 DEF FNpolyline_plot_code
1480 LOCAL linetype,colour_index
1490 CASE (aspect_source_flags(ASF_POLYLINE_LINETYPE)) OF
1500 WHEN BUNDLED:
1510 linetype=line_bundle(line_index,POLYLINE_LINETYPE)
1520 WHEN INDIVIDUAL:
1530 linetype=polyline_linetype
1540 OTHERWISE:
1550 PROCgks_error("Unknown ASF flag")
1560 ENDCASE
1570 :
1580 CASE (aspect_source_flags(ASF_POLYLINE_COLOUR_INDEX)) OF
1590 WHEN BUNDLED:
1600 colour_index=line_bundle(line_index,POLYLINE_COLOUR_INDEX)
1610 WHEN INDIVIDUAL:
```

Continued ▶

**◀ Listing 2. GKS Library continued**

```
1620 colour_index=polyline_co
lour_index
1630 OTHERWISE:
1640 PROCgks_error("Unknown A
SF flag")
1650 ENDCASE
1660 :
1670 CASE linetype OF
1680 WHEN solid:
1690 plot_code=5
1700 WHEN dotted:
1710 *FX163,242,0
1720 plot_code=21
1730 WHEN dashed:
1740 VDU 23,6,255,0,255,0,255
,0,255,0
1750 *FX163,242,64
1760 plot_code=&35
1770 WHEN dot_dashed:
1780 VDU 23,6,255,%00011000,2
55,%11000001,0,255,255,255
1790 *FX163,242,16
1800 plot_code=&35
1810 WHEN heavy_dot:
1820 VDU 23,6,%11001100,%1100
1100,%11001100,%11001100,%1100
1100,%11001100,%11001100,%1100
1100
1830 *FX163,242,16
1840 plot_code=&35
1850 OTHERWISE:
1860 plot_code=5
1870 ENDCASE
1880 :
1890 GCOL 0,colour_index
1900 =plot_code
1910 :
1920 DEF PROCopen_gks(errfil)
1930 PROCinitialise_gks_const
s
1940 LOCAL ERROR
1950 ON ERROR LOCAL IF ERR=26
THEN gks_state=GKS_OPEN:RESTO
RE ERROR:ENDPROC ELSE REPORT:P
RINT " at " ERL:END
1960 IF (gks_state<>GKS_CLOSE
D)
1970 PROCgks_error("open_gks:
GKS in wrong state")
1980 ELSE
1990 gks_state=GKS_OPEN
2000 ENDIF
2010 ON ERROR OFF
2020 ENDPROC
2030 :
2040 DEF PROCclose_gks
2050 LOCAL ERROR
2060 ON ERROR LOCAL IF ERR=26
PROCgks_error("close_gks: GKS
in wrong state"):ENDPROC ELSE
REPORT:PRINT " at " ERL:END
2070 IF (gks_state<>GKS_OPEN)
THEN
2080 PROCgks_error("close_gks
: GKS in wrong state")
2090 ELSE
2100 gks_state=GKS_CLOSED
2110 ENDIF
2120 ENDPROC
2130 :
2140 DEF PROCopen_workstation
(wkid,conid,wtype)
2150 LOCAL ERROR
2160 ON ERROR LOCAL IF ERR=26
PROCgks_error("open_workstati
on: GKS in wrong state"):ENDPR
OC ELSE REPORT:PRINT " at ", E
RL:END
2170 IF (gks_state<>GKS_OPEN)
THEN
2180 PROCgks_error("open_work
station: GKS in wrong state")
2190 ELSE
2200 gks_state=WORKSTATION_OP
EN
2210 MODE wtype
2220 PROCinitialise_bundles(w
type)
2230 PROCclear_workstation(1,
ALWAYS)
2240 ENDIF
2250 ENDPROC
2260 :
2270 DEF PROCclose_workstatio
n(wkid)
2280 LOCAL ERROR
2290 ON ERROR LOCAL IF ERR=26
PROCgks_error("close_workstat
ion: GKS in wrong state"):ENDP
ROC ELSE REPORT:PRINT " at ",E
RL:END
2300 IF (gks_state<>WORKSTATI
ON_OPEN) THEN
2310 PROCgks_error("close_wor
kstation: GKS in wrong state")
2320 ELSE
2330 gks_state=GKS_OPEN
2340 ENDIF
2350 ENDPROC
2360 :
2370 DEF PROCactivate_worksta
tion(wkid)
2380 LOCAL ERROR
2390 ON ERROR LOCAL IF ERR=26
PROCgks_error("activate_works
tation: GKS in wrong state"):E
NDPROC ELSE REPORT:PRINT " at
",ERL:END
2400 IF (gks_state<>WORKSTATI
ON_OPEN) THEN
2410 PROCgks_error("activate_
workstation: GKS in wrong stat
e")
2420 ELSE
2430 gks_state=WORKSTATION_AC
TIVE
2440 active_ws=wkid
2450 ENDIF
2460 ENDPROC
2470 :
2480 DEF PROCdeactivate_works
tation(wkid)
2490 LOCAL ERROR
2500 ON ERROR LOCAL IF ERR=26
PROCgks_error("deactivate_wor
kstation: GKS in wrong state")
:ENDPROC ELSE REPORT:PRINT " a
t ",ERL:END
2510 IF (gks_state<>WORKSTATI
ON_ACTIVE) THEN
2520 PROCgks_error("deactivat
e_workstation: GKS in wrong st
ate")
2530 ELSE
2540 gks_state=WORKSTATION_OP
EN
2550 ENDIF
2560 RESTORE ERROR
2570 ENDPROC
2580 :
2590 DEF PROCset_window(tnr,x
min,xmax,ymin,ymax)
2600 IF (tnr>MAX_NORM_TRANSFO
RMS) OR (tnr<0) THEN
2610 PROCgks_error("set_windo
w: transformation number out o
f range")
2620 ENDPROC
2630 ELSE IF (tnr=0) THEN
2640 PROCgks_error("set_windo
w: can't change normalisation
transformation 0")
2650 ENDPROC
2660 ENDIF
2670 ENDIF
2680 :
2690 norm_trans(tnr,XW_MIN)=x
min
2700 norm_trans(tnr,XW_MAX)=x
max
2710 norm_trans(tnr,YW_MIN)=y
min
2720 norm_trans(tnr,YW_MAX)=y
max
2730 ENDPROC
2740 :
2750 DEF PROCclear_workstatio
n(wkid,cofl)
2760 CLS
2770 ENDPROC
2780 :
2790 DEF PROCset_viewport(tnr
,xmin,xmax,ymin,ymax)
2800 IF (tnr>MAX_NORM_TRANSFO
RMS) OR (tnr<0) THEN
2810 PROCgks_error("set_viewp
ort: transformation number out
 of range")
2820 ENDPROC
2830 ELSE IF (tnr=0) THEN
2840 PROCgks_error("set_viewp
ort: can't change normalisatio
n transformation 0" )
2850 ENDPROC
2860 ENDIF
2870 ENDIF
2880 :
2890 norm_trans(tnr,XV_MIN)=x
min
2900 norm_trans(tnr,XV_MAX)=x
max
2910 norm_trans(tnr,YV_MIN)=y
min
2920 norm_trans(tnr,YV_MAX)=y
max
2930 ENDIF
2940 ENDPROC
2950 :
2960 DEF PROCselect_normaliza
tion_transformation(tnr)
2970 _xw_min=norm_trans(tnr,X
W_MIN)
2980 _xw_max=norm_trans(tnr,X
W_MAX)
2990 _yw_min=norm_trans(tnr,Y
W_MIN)
3000 _yw_max=norm_trans(tnr,Y
W_MAX)
3010 _xv_min=norm_trans(tnr,X
V_MIN)*DEVICE_X_SCALE
3020 _xv_max=norm_trans(tnr,X
V_MAX)*DEVICE_Y_SCALE
3030 _yv_min=norm_trans(tnr,Y
V_MIN)*DEVICE_X_SCALE
3040 _yv_max=norm_trans(tnr,Y
V_MAX)*DEVICE_Y_SCALE
3050 _sx=(_xv_max-_xv_min)/(_
xw_max-_xw_min)
3060 _sy=(_yv_max-_yv_min)/(_
yw_max-_yw_min)
3070 PROCset_clipping_indicat
or(clipping_indicator)
3080 ENDPROC
3090 :
3100 DEF PROCset_clipping_ind
icator(clsw)
3110 CASE clsw OF
3120 WHEN CLIP:
3130 VDU 24,_xv_min;_yv_min;_
xv_max;_yv_max;
3140 WHEN NOCLIP:
3150 VDU 24,0;0;1.0*DEVICE_X_
SCALE;1.0*DEVICE_Y_SCALE;
3160 ENDCASE
3170 clipping_indicator=clsw
3180 ENDPROC
3190 :
3200 DEF PROCpolymarker(n,px(
),py())
3210 LOCAL i
3220 i=1
3230 WHILE (i<=n)
3240 PROCmarker(FNmap_x(px(i)
),FNmap_y(py(i)))
3250 i+=1
3260 ENDWHILE
3270 ENDPROC
3280 :
```

**Continued ▶**

◀ **Listing 2. GKS Library continued**

```
3290 DEF PROCmarker(x,y)
3300 LOCAL type,colour_index,
scale,delta
3310 CASE (aspect_source_flag
s(ASF_MARKER_TYPE)) OF
3320 WHEN BUNDLED:
3330 type=marker_bundle(marke
r_index,MARKER_TYPE)
3340 WHEN INDIVIDUAL:
3350 type=marker_type
3360 OTHERWISE:
3370 PROCgks_error("Unknown A
SF flag")
3380 ENDCASE
3390 :
3400 CASE (aspect_source_flag
s(ASF_MARKER_COLOUR_INDEX)) OF
3410 WHEN BUNDLED:
3420 colour_index=marker_bund
le(marker_index,MARKER_COLOUR_
INDEX)
3430 WHEN INDIVIDUAL:
3440 colour_index=marker_colo
ur_index
3450 OTHERWISE:
3460 PROCgks_error("Unknown A
SF flag")
3470 ENDCASE
3480 :
3490 CASE (aspect_source_flag
s(ASF_MARKER_SIZE_SCALE_FACTOR
)) OF
3500 WHEN BUNDLED:
3510 scale=marker_bundle(mark
er_index,MARKER_SIZE_SCALE_FAC
TOR)
3520 WHEN INDIVIDUAL:
3530 scale=marker_size_scale_
factor
3540 OTHERWISE:
3550 PROCgks_error("Unknown A
SF flag")
3560 ENDCASE
3570 :
3580 GCOL 0,colour_index
3590 CASE type OF
3600 WHEN CROSS:
3610 delta=scale*8
3620 LINE x-delta,y-delta,x+d
elta,y+delta
3630 LINE x+delta,y-delta,x-d
elta,y+delta
3640 :
3650 WHEN PLUS:
3660 delta=scale*8
3670 LINE x,y-delta,x,y+delta
3680 LINE x-delta,y,x+delta,y
3690 :
3700 WHEN STAR:
3710 delta=scale*6
3720 LINE x-delta,y-delta,x+d
elta,y+delta
3730 LINE x+delta,y-delta,x-d
elta,y+delta
3740 LINE x,y-delta,x,y+delta
3750 LINE x-delta,y,x+delta,y
3760 :
3770 WHEN ROUND:
3780 CIRCLE x,y,6*scale
3790 :
3800 WHEN DOT:
3810 POINT x,y
3820 :
3830 OTHERWISE:
3840 PROCgks_error("Unknown m
arker type")
3850 ENDCASE
3860 ENDPROC
3870 :
3880 DEF PROCset_polymarker_i
ndex(index)
3890 marker_index=index
3900 ENDPROC
3910 :
3920 DEF PROCset_polymarker_c
olour_index(coli)
3930 marker_colour_index=coli
3940 ENDPROC
3950 :
3960 DEF PROCset_marker_type(
mtype)
3970 marker_type=mtype
3980 ENDPROC
3990 :
4000 DEF PROCset_marker_size_
scale_factor(scale)
4010 marker_size_scale_factor
=scale
4020 ENDPROC
4030 :
4040 DEF PROCset_text_colour_
index(coli)
4050 text_colour_index=coli
4060 ENDPROC
4070 :
4080 DEF PROCgks_error(report
$)
4090 PRINT report$
4100 ENDPROC
4110 :
4120 DEF PROCinitialise_gks_c
onsts
4130 GKS_OPEN=0
4140 GKS_CLOSED=1
4150 WORKSTATION_OPEN=2
4160 WORKSTATION_ACTIVE=3
4170 SEGMENT_OPEN=4
4180 NOCLIP=0
4190 CLIP=1
4200 DOT=1
4210 PLUS=2
4220 STAR=3
4230 ROUND=4
4240 CROSS=5
4250 polyline_index=1
4260 marker_index=1
4270 normalisation_transforma
tion=0
4280 clipping_indicator=CLIP
4290 MAX_WS_OPEN=1
4300 MAX_NORM_TRANSFORMS=20
4310 DEVICE_X_SCALE=1023
4320 DEVICE_Y_SCALE=1023
4330 active_ws=0
4340 XW_MIN=0
4350 XW_MAX=1
4360 YW_MIN=2
4370 YW_MAX=3
4380 XV_MIN=4
4390 XV_MAX=5
4400 YV_MIN=6
4410 YV_MAX=7
4420 ALWAYS=0
4430 CONDITIONALLY=1
4440 DIM norm_trans(MAX_NORM_
TRANSFORMS,YV_MAX)
4450 FOR tnr=0 TO MAX_NORM_TR
ANSFORMS
4460 norm_trans(tnr,XW_MIN)=0
4470 norm_trans(tnr,XW_MAX)=1
4480 norm_trans(tnr,YW_MIN)=0
4490 norm_trans(tnr,YW_MAX)=1
4500 norm_trans(tnr,XV_MIN)=0
4510 norm_trans(tnr,XV_MAX)=1
4520 norm_trans(tnr,YV_MIN)=0
4530 norm_trans(tnr,YV_MAX)=1
4540 NEXT tnr
4550 :
4560 PROCselect_normalization
_transformation(0)
4570 :
4580 POLYLINE_LINETYPE=0
4590 POLYLINE_COLOUR_INDEX=1
4600 MAX_LINE_BUNDLE=5
4610 DIM line_bundle(MAX_LINE
_BUNDLE,POLYLINE_COLOUR_INDEX)
4620 MARKER_TYPE=0
4630 MARKER_COLOUR_INDEX=1
4640 MARKER_SIZE_SCALE_FACTOR
=2
4650 MAX_MARKER_BUNDLE=5
4660 DIM marker_bundle(MAX_MA
RKER_BUNDLE,MARKER_SIZE_SCALE_
FACTOR)
4670 MAX_TEXT_BUNDLE=5
4680 solid=1
4690 dotted=2
4700 dashed=3
4710 dot_dashed=4
4720 heavy_dot=5
4730 RIGHT=0
4740 LEFT=1
4750 BASE=2
4760 CENTRE=3
4770 ATOP=4
4780 NORMAL=5
4790 BOTTOM=6
4800 CAP=7
4810 HALF=8
4820 UP=9
4830 DOWN=10
4840 STRING=0
4850 CHARACTER=1
4860 STROKE=2
4870 text_colour_index=1
4880 text_horiz_align=NORMAL
4890 text_vert_align=NORMAL
4900 text_path=RIGHT
4910 text_character_expansion
_factor=1
4920 text_character_height=1
4930 text_character_spacing=0
.1
4940 text_charup_x=0
4950 text_charup_y=1
4960 text_font=1
4970 TEXT_COLOUR_INDEX=0
4980 TEXT_FONT=1
4990 TEXT_PRECISION=2
5000 TEXT_CHARACTER_EXPANSION
_FACTOR=3
5010 TEXT_CHARACTER_SPACING=4
5020 DIM text_bundle(MAX_TEXT
_BUNDLE,TEXT_CHARACTER_SPACING
)
5030 BUNDLED=0
5040 INDIVIDUAL=1
5050 ASF_POLYLINE_LINETYPE=0
5060 ASF_POLYLINE_COLOUR_INDE
X=1
5070 ASF_MARKER_TYPE=2
5080 ASF_MARKER_SIZE_SCALE_FA
CTOR=3
5090 ASF_MARKER_COLOUR_INDEX=
4
5100 ASF_TEXT_COLOUR_INDEX=5
5110 ASF_TEXT_FONT_AND_PRECIS
ION=6
5120 ASF_TEXT_CHARACTER_EXPAN
SION_FACTOR=7
5130 ASF_TEXT_CHARACTER_SPACI
NG=8
5140 DIM aspect_source_flags(
ASF_TEXT_CHARACTER_SPACING)
5150 ENDPROC
5160 :
5170 DEF PROCline(x,y)
5180 DRAW FNmap_x(x),FNmap_y(
y)
5190 ENDPROC
5200 :
5210 DEF PROCmove(x,y)
5220 MOVE FNmap_x(x),FNmap_y(
y)
5230 ENDPROC
5240 :
5250 DEF FNmap_x(xw)
5260 =_sx*(xw-_xw_min)+_xv_mi
n
5270 :
5280 DEF FNmap_y(yw)
5290 =_sy*(yw-_yw_min)+_yv_mi
n
5300 :
5310 DEF PROCclear_viewport
5320 CASE clipping_indicator
OF
5330 WHEN CLIP:
```

**Continued** ▶

◀ Listing 2. GKS Library continued

```
 5340 CLG
 5350 WHEN NOCLIP:
 5360 VDU 24,_xv_min;_yv_min;_
xv_max;_yv_max;
 5370 CLG
 5380 VDU 24,0;0;1.0*DEVICE_X_
SCALE;1.0*DEVICE_Y_SCALE;
 5390 ENDCASE
 5400 ENDPROC
 5410 :
 5420 DEF PROCset_text_path(ch
p)
 5430 IF ((chp<RIGHT) OR (chp>
DOWN)) THEN
 5440 PROCerror("set_text_path
:unknown path")
 5450 ELSE
 5460 text_path=chp
 5470 ENDIF
 5480 ENDPROC
 5490 :
 5500 DEF PROCset_text_alignme
nt(horizontal,vertical)
 5510 text_horiz_align=horizon
tal
 5520 text_vert_align=vertical
 5530 ENDPROC
 5540 :
 5550 DEF PROCset_character_up
_vector(chux,chuy)
 5560 text_charup_x=chux
 5570 text_charup_y=chuy
 5580 ENDPROC
 5590 :
 5600 DEF PROCset_text_font_an
d_precision(font,prec)
 5610 text_font=font
 5620 text_precision=prec
 5630 ENDPROC
 5640 :
 5650 DEF PROCset_character_he
ight(chh)
 5660 text_character_height=ch
h
 5670 ENDPROC
 5680 :
 5690 DEF PROCset_character_ex
pansion_factor(chxp)
 5700 text_character_expansion
_factor=chxp
 5710 ENDPROC
 5720 :
 5730 DEF PROCset_character_sp
acing(chsp)
 5740 text_character_spacing=c
hsp
 5750 ENDPROC
 5760 :
 5770 DEF PROCset_text_index(i
ndex)
 5780 text_index=index
 5790 ENDPROC
 5800 :
 5810 DEF PROCset_text_represe
ntation(wkid,text_index,font,p
rec,chxp,chsp,coli)
 5820 text_bundle(text_index,T
EXT_FONT)=font
 5830 text_bundle(text_index,T
EXT_PRECISION)=prec
 5840 text_bundle(text_index,T
EXT_CHARACTER_EXPANSION_FACTOR
)=chxp
 5850 text_bundle(text_index,T
EXT_CHARACTER_SPACING)=chsp
 5860 text_bundle(text_index,T
EXT_COLOUR_INDEX)=coli
 5870 ENDPROC
 5880 :
 5890 DEF PROCtext(x,y,text$)
 5900 IF aspect_source_flags(A
SF_TEXT_COLOUR_INDEX)=INDIVIDU
AL THEN
 5910 colour=text_colour_index
 5920 ELSE
 5930 colour=text_bundle(text_
index,TEXT_COLOUR_INDEX)
 5940 ENDIF
 5950 IF aspect_source_flags(A
SF_TEXT_FONT_AND_PRECISION)=IN
DIVIDUAL THEN
 5960 font=text_font
 5970 precision=text_precision
 5980 ELSE
 5990 font=text_bundle(text_in
dex,TEXT_FONT)
 6000 precision=text_bundle(te
xt_index,TEXT_PRECISION)
 6010 ENDIF
 6020 IF aspect_source_flags(A
SF_TEXT_CHARACTER_EXPANSION_FA
CTOR)=INDIVIDUAL THEN
 6030 character_expansion_fact
or=text_character_expansion_fa
ctor
 6040 ELSE
 6050 character_expansion_fact
or=text_bundle(text_index,TEXT
_CHARACTER_EXPANSION_FACTOR)
 6060 ENDIF
 6070 IF aspect_source_flags(A
SF_TEXT_CHARACTER_SPACING)=IND
IVIDUAL THEN
 6080 character_spacing=text_c
haracter_spacing
 6090 ELSE
 6100 character_spacing=text_b
undle(text_index,TEXT_CHARACTE
R_SPACING)
 6110 ENDIF
 6120 PROCrender_text(text$,x,
y,text_horiz_align,text_vert_a
lign,text_path,text_charup_x,t
ext_charup_y,text_character_he
ight,character_expansion_facto
r,character_spacing,font,preci
sion,colour)
 6130 ENDPROC
 6140 :
 6150 DEF PROCrender_text(text
$,sx,sy,horiz_align,vert_align
,path,charup_x,charup_y,height
,exp_factor,space,font,precisi
on,colour)
 6160 LOCAL n,adjustment,i
 6170 n =LEN(text$)
 6180 LOCAL start_x(),start_y(
)
 6190 DIM start_x(n),start_y(n
)
 6200 IF precision=STRING THEN
 6210 start_x(0)=sx
 6220 start_y(0)=sy
 6230 PROCshow_text(text$,star
t_x(),start_y(),n,height,exp_f
actor,nx,ny,font,precision,col
our)
 6240 ENDPROC
 6250 ENDIF
 6260 IF horiz_align=NORMAL TH
EN
 6270 CASE text_path OF
 6280 WHEN RIGHT:
 6290 horiz_align=LEFT
 6300 :
 6310 WHEN LEFT:
 6320 horiz_align=RIGHT
 6330 :
 6340 WHEN UP:
 6350 horiz_align=CENTRE
 6360 :
 6370 WHEN DOWN:
 6380 horiz_align=CENTRE
 6390 ENDCASE
 6400 ENDIF
 6410 IF vert_align=NORMAL THE
N
 6420 CASE text_path OF
 6430 WHEN RIGHT:
 6440 vert_align=BASE
 6450 :
 6460 WHEN LEFT:
 6470 vert_align=BASE
 6480 :
 6490 WHEN UP:
 6500 vert_align=BASE
 6510 :
 6520 WHEN DOWN:
 6530 vert_align=ATOP
 6540 ENDCASE
 6550 ENDIF
 6560 IF (text_path=RIGHT OR t
ext_path=LEFT) THEN
 6570 length=0
 6580 FOR i=1 TO n
 6590 length+=FNfont_width(MID
$(text$,i,1))*exp_factor
 6600 NEXT
 6610 length+=(n-1)*space
 6620 CASE text_path OF
 6630 WHEN RIGHT:
 6640 start_x(1)=0
 6650 FOR i=1 TO n-1
 6660 width=FNfont_width(MID$(
text$,i,1))*exp_factor
 6670 start_x(i+1)=start_x(i)+
width+space
 6680 NEXT
 6690 :
 6700 WHEN LEFT:
 6710 start_x(n)=0
 6720 FOR i=n TO 2 STEP-1
 6730 width=FNfont_width(MID$(
text$,i-1,1))*exp_factor
 6740 start_x(i-1)=start_x(i)+
width+space
 6750 NEXT
 6760 ENDCASE
 6770 adjustment=FNadjust_hori
z(horiz_align,length)
 6780 start_x()+=adjustment
 6790 adjustment=FNadjust_vert
(vert_align)
 6800 start_y()+=adjustment
 6810 cpy=0
 6820 CASE horiz_align OF
 6830 WHEN LEFT:
 6840 cpx=length+space
 6850 :
 6860 WHEN CENTRE:
 6870 cpx=0
 6880 :
 6890 WHEN RIGHT:
 6900 cpx=-(length+space)
 6910 ENDCASE
 6920 ELSE
 6930 length=n*(FNfont_top_lin
e-FNfont_bottom_line)+(n-1)*sp
ace
 6940 width=FNfont_width_max*e
xp_factor
 6950 :
 6960 FOR i=1 TO n
 6970 start_x(i)+=-0.5*FNfont_
width(MID$(text$,i,1))*exp_fac
tor
 6980 NEXT
 6990 :
 7000 CASE text_path OF
 7010 WHEN UP:
 7020 start_y(1)=-FNfont_botto
m_line
 7030 extra=(FNfont_top_line-F
Nfont_bottom_line)+space
 7040 FOR i=1 TO n-1
 7050 start_y(i+1)=start_y(i)+
extra
 7060 NEXT
 7070 :
 7080 WHEN DOWN:
 7090 start_y(n)=-FNfont_botto
m_line
 7100 extra=(FNfont_top_line-F
Nfont_bottom_line)+space
 7110 FOR i=n TO 2 STEP-1
 7120 start_y(i-1)=start_y(i)+
extra
 7130 NEXT
```

Continued ▶

**◀ Listing 2. GKS Library continued**

```
 7140 ENDCASE
 7150 CASE horiz_align OF
 7160 WHEN LEFT:
 7170 adjustment=0.5*width
 7180 :
 7190 WHEN RIGHT:
 7200 adjustment=-0.5*width
 7210 :
 7220 WHEN CENTRE:
 7230 adjustment=0
 7240 ENDCASE
 7250 start_x()+=adjustment
 7260 CASE vert_align OF
 7270 WHEN BOTTOM:
 7280 adjustment=0
 7290 :
 7300 WHEN BASE:
 7310 adjustment=FNfont_bottom
_line
 7320 :
 7330 WHEN HALF:
 7340 adjustment=-0.5*((FNfont
_half_line-FNfont_bottom_line)
+length-(FNfont_top_line-FNfon
t_half_line))
 7350 :
 7360 WHEN CAP:
 7370 adjustment=-(length-(FNf
ont_top_line-1))
 7380 :
 7390 WHEN ATOP:
 7400 adjustment=-length
 7410 ENDCASE
 7420 start_y()+=adjustment
 7430 cpx=0
 7440 CASE vert_align OF
 7450 WHEN BOTTOM:
 7460 cpy=length+space
 7470 :
 7480 WHEN BASE:
 7490 cpy=length+space
 7500 :
 7510 WHEN HALF:
 7520 cpy=0
 7530 :
 7540 WHEN ATOP:
 7550 cpy=-(length+space)
 7560 :
 7570 WHEN CAP:
 7580 cpy=-(length+space)
 7590 ENDCASE
 7600 ENDIF
 7610 nx=charup_x/SQR((charup_
x^2)+(charup_y^2))
 7620 ny=charup_y/SQR((charup_
x^2)+(charup_y^2))
 7630 a=height*ny:b=height*nx:
c=sx
 7640 d=-height*nx:e=height*ny
:f=sy
 7650 FOR i=1 TO n
 7660 x_temp=start_x(i)
 7670 start_x(i)=a*start_x(i)+
b*start_y(i)+c
 7680 start_y(i)=d*x_temp+e*st
art_y(i)+f
 7690 NEXT
 7700 PROCshow_text(text$,star
t_x(),start_y(),n,height,exp_f
actor,nx,ny,font,precision,col
our)
 7710 ENDPROC
 7720 :
 7730 DEF FNadjust_horiz(horiz
_align,length)
 7740 CASE horiz_align OF
 7750 WHEN LEFT:
 7760 =0
 7770 :
 7780 WHEN CENTRE:
 7790 =-(0.5*length)
 7800 :
 7810 WHEN RIGHT:
 7820 =-length
 7830 OTHERWISE:
 7840 PRINT "Unknown horizonta
l text alignment"
 7850 STOP
 7860 ENDCASE
 7870 :
 7880 DEF FNadjust_vert(vert_a
lign)
 7890 CASE vert_align OF
 7900 WHEN BOTTOM:
 7910 =-FNfont_bottom_line
 7920 :
 7930 WHEN BASE:
 7940 =0
 7950 :
 7960 WHEN HALF:
 7970 =-FNfont_half_line
 7980 :
 7990 WHEN CAP:
 8000 =-1
 8010 :
 8020 WHEN ATOP:
 8030 =-FNfont_top_line
 8040 OTHERWISE:
 8050 PRINT "Unknown vertical
text alignment"
 8060 STOP
 8070 ENDCASE
 8080 :
 8090 DEF FNfont_width(c$)
 8100 =1
 8110 :
 8120 DEF FNfont_width_max
 8130 =1
 8140 :
 8150 DEF FNfont_bottom_line
 8160 =-(1/16)
 8170 :
 8180 DEF FNfont_top_line
 8190 =1
 8200 :
 8210 DEF FNfont_half_line
 8220 =0.5
 8230 :
 8240 DEF PROCshow_text(text$,
start_x(),start_y(),n,height,e
xp_factor,nx,ny,font,precision
,colour)
 8250 LOCAL x1,y2,x2,y2
 8260 LOCAL i
 8270 LOCAL x_temp
 8280
 8290 IF precision=STRING THEN
 8300 GCOL 0,colour
 8310 VDU 5
 8320 MOVE FNmap_x(start_x(0))
,FNmap_y(start_y(0))+TEXT_OFFS
ET_Y
 8330 PRINT text$
 8340 VDU 4
 8350 ENDPROC
 8360 ENDIF
 8370 IF precision=CHARACTER T
HEN
 8380 GCOL 0,colour
 8390 VDU 5
 8400 FOR i=1 TO n
 8410 MOVE FNmap_x(start_x(i))
,FNmap_y(start_y(i))+TEXT_OFFS
ET_Y
 8420 PRINT MID$(text$,i,1)
 8430 NEXT
 8440 VDU 4
 8450 ENDPROC
 8460 ENDIF
 8470 GCOL 0,colour
 8480 FOR i=1 TO n
 8490 PROCrestore("characters"
)
 8500 READ x1,y1,x2,y2
 8510 WHILE NOT(x1=0 AND y1=0
AND x2=0 AND y2=0)
 8520 x1=(x1*exp_factor*height
)/10
 8530 x2=(x2*exp_factor*height
)/10
 8540 y1=(y1*height)/10
 8550 y2=(y2*height)/10
 8560 x_temp=x1
 8570 x1=ny*x1+nx*y1+start_x(i
)
 8580 y1=-nx*x_temp+ny*y1+star
t_y(i)
 8590 x_temp=x2
 8600 x2=ny*x2+nx*y2+start_x(i
)
 8610 y2=-nx*x_temp+ny*y2+star
t_y(i)
 8620 :
 8630 MOVE FNmap_x(x1),FNmap_y
(y1)
 8640 DRAW FNmap_x(x2),FNmap_y
(y2)
 8650 READ x1,y1,x2,y2
 8660 ENDWHILE
 8670 NEXT
 8680 ENDPROC
 8690 :
 8700 DEF PROCrestore(label$)
 8710 LOCAL place$
 8720 label$="."+label$
 8730 RESTORE
 8740 REPEAT
 8750 READ place$
 8760 UNTIL (place$=label$)
 8770 ENDPROC
```

**See Strength of Resolve, page 73**

**Listing 1. HRdump**

```
 10 REM High-Resolution Dump
 20 REM By Michael Geller
 30 REM B/B+/M/C/E (shadow RAM off)
 40 REM (c) Acorn User December 1988
 50 :
 60 ON ERROR PROCerror:END
 70 MODE 0
 80 ch%=0
 90 file$=FNgetfile
 100 CLS
 110 FOR YGrOff%=1024 TO 0 STEP -1024
 120 xorig%=0
 130 yorig%=-YGrOff%
 140 YTxtOff%=YGrOff%/32
 150 XTxtPos%=0
 160 YTxtPos%=YTxtOff%-32
 170 ch%=OPENUP(file$)
 180 VDU 29,xorig%;yorig%;
 190 REPEAT
 200 byte%=BGET# ch%
 210 IF byte%>31 AND byte%<127 THEN PRO
Cchar(byte%)
```

**Continued ▶**

◀ **Listing 1. HRdump continued**

```
220 IF byte%=12 THEN CLS
230 IF byte%=16 THEN CLG
240 IF byte%=17 THEN VDU 17:PROCvdu(1)
250 IF byte%=18 THEN VDU 18:PROCvdu(2)
260 IF byte%=19 THEN VDU 19:PROCvdu(5)
270 IF byte%=20 THEN VDU 20
280 IF byte%=23 THEN VDU 23:PROCvdu(9)
290 IF byte%=24 THEN PROCgrWindow
300 IF byte%=25 THEN PROCplot
310 IF byte%=26 THEN VDU 26
320 IF byte%=29 THEN PROCorigin
330 IF byte%=30 THEN PROChome
340 IF byte%=31 THEN PROCtab
350 UNTIL EOF# ch%
360 CLOSE# ch%
370 IF YGrOff%<>0 THEN *SAVE "H.TopScr
n" 3000 8000
380 IF YGrOff%=0 THEN *SAVE "H.BotScrn
" 3000 8000
390 CLS
400 NEXT YGrOff%
410 PROCdump
420 END
430 :
440 DEF PROCchar(byte%)
450 IF YTxtPos%<0 THEN ENDPROC
460 LOCAL A%,X%,Y%
470 ?&70=byte%
480 X%=&70:Y%=0:A%=10
490 CALL &FFF1
500 VDU 23,254,?&71,?&71,?&72,?&72
510 VDU ?&73,?&73,?&74,?&74
520 VDU 23,255,?&75,?&75,?&76,?&76
530 VDU ?&77,?&77,?&78,?&78
540 PRINT TAB(XTxtPos%,YTxtPos%);
550 VDU 254,10,8,255
560 XTxtPos%=XTxtPos%+1
570 IF XTxtPos%>79 THEN PROCnewline
580 ENDPROC
590 :
600 DEF PROCnewline
610 XTxtPos%=0
620 YTxtPos%=YTxtPos%+2
630 ENDPROC
640 :
650 DEF PROCvdu(no%)
660 LOCAL loop%
670 FOR loop%=1 TO no%
680 VDU BGET#ch%
690 NEXT loop%
700 ENDPROC
710 :
720 DEF PROCgrWindow
730 LOCAL lx%,by%,rx%,ty%
740 lx%=FNxval
750 by%=FNyval
760 rx%=FNxval
770 ty%=FNyval
780 REPEAT
790 IF by%>32767 THEN by%=by%-65536
800 IF ty%>32767 THEN ty%=ty%-65536
810 UNTIL by%<32768 AND ty%<32768
820 IF by%+yorig%<0 THEN by%=-yorig%
830 IF ty%+yorig%>1023 THEN ty%=1023-y
orig%
840 VDU 24,lx%;by%;rx%;ty%;
850 ENDPROC
860 :
870 DEF PROCplot
880 LOCAL option%,xval%,yval%
890 option%=BGET#ch%
900 xval%=FNxval
910 yval%=FNyval
920 PLOT option%,xval%,yval%
930 ENDPROC
940 :
950 DEF PROCorigin
960 xorig%=FNxval
970 yorig%=FNyval-YGrOff%
980 VDU 29,xorig%;yorig%;
990 ENDPROC
1000 :
1010 DEF PROChome
1020 XTxtPos%=0
1030 YTxtOff%=YGrOff%/32
1040 ENDPROC
1050 :
1060 DEF PROCtab
1070 LOCAL xval%,yval%
1080 xval%=BGET# ch%
1090 yval%=BGET# ch%
1100 XTxtPos%=xval%
1110 YTxtPos%=YTxtOff%-31+yval%*2
1120 ENDPROC
1130 :
1140 DEF FNxval
1150 =BGET# ch%+BGET# ch%*256
1160 :
1170 DEF FNyval
1180 =2*(BGET# ch%+BGET# ch%*256)
1190 :
1200 :
1210 DEF PROCerror
1220 CLS
1230 CLOSE# ch%
1240 VDU 3
1250 REPORT
1260 PRINT;" at line ";ERL
1270 ENDPROC
1280 :
1290 DEF FNgetfile
1300 LOCAL file$,tempch%
1310 REPEAT
1320 INPUT''"Name of *SPOOLed file ? "f
ile$
1330 tempch%=OPENUP(file$)
1340 IF tempch%=0 THEN PRINT'"No such f
ile!"
1350 CLOSE# tempch%
1360 UNTIL tempch%<>0
1370 =file$
1380 :
1390 DEF PROCdump
1400 LOCAL column%,char%,byte%,print%
1410 VDU 2,1,27,1,51,1,24
1420 FOR column%=0 TO 79
1430 VDU 1,27,1,42,1,5,1,0,1,2
1440 *LOAD H.BotScrn 3000
1450 FOR char%=31 TO 0 STEP -1
1460 FOR byte%=7 TO 0 STEP -1
1470 print%=?(&3000+column%*8+char%*640
+byte%)
1480 VDU 1,print%
1490 NEXT byte%
1500 NEXT char%
1510 *LOAD H.TopScrn 3000
1520 FOR char%=31 TO 0 STEP -1
1530 FOR byte%=7 TO 0 STEP -1
1540 print%=?(&3000+column%*8+char%*640
+byte%)
1550 VDU 1,print%
1560 NEXT byte%
1570 NEXT char%
1580 VDU 1,13
1590 NEXT column%
1600 VDU 3
1610 ENDPROC
```

◀ See In Times of Crisis, page 79

**Listing 1. CopyPact**

```
   10 REM Bad FS Recovery/Compacter
   20 REM by Philip Trinham
   30 REM B/B+/M/C with ADFS
   40 REM (C) Acorn User December 1988
   50 :
   60 MODE 7
   70 PROCinitial
   80 PROCdrives
   90 ON ERROR PROCsyserror
  100 REPEAT
  110 rootS$=FNrootdir
  120 root%=FNsectof(rootS$)
  130 UNTIL root%<>0
  140 PROCtree(rootD$,root%,Stack%)
  150 PRINT 'CHR$26 TAB(0,24)"Task Compl
ete"'
  160 SOUND 1,-12,101,5
  170 END
  180 :
  190 DEF PROCinitial
  200 osgbpb=&FFD1
  210 osfile=&FFDD
  220 osword=&FFF1
  230 oscli =&FFF7
  240 read%=8
  250 write%=10
  260 Buffer%=TOP+&B00
  270 buflen%=(HIMEM-Buffer%-&400)DIV256
*256
  280 DIM Rootcat% &4FF,Stack% &1FF,Fnam
e% 10,Temp% 10
  290 Clibuf%=&700
  300 Param%=&70
  310 title$=STRING$(19,"."):title$=""
  320 ENDPROC
  330 :
  340 DEF PROCdrives
  350 LOCAL path$
  360 CLS:VDU 15
  370 PRINT " Bad FS Recovery/Compaction
 Utility"
  380 PRINT " ____________________________
_________"
  390 VDU 28,0,24,39,3
  400 PRINT CHR$131 "Do you have 1 or 2
drives? (1/2) : ";
  410 REPEAT swap=GET-&30
  420 UNTIL swap=1 OR swap=2
  430 PRINT CHR$(swap+&30)
  440 swap=swap-2
  450 pathS$=":0"
  460 IF swap THEN pathD$=":0" ELSE path
D$=":1"
  470 IF swap THEN PROCmarkD ELSE PRINT
'" Insert the SOURCE disc in drive 0"'"
and the DESTINATION disc in drive 1."
  480 ENDPROC
  490 :
  500 DEF PROCmarkD
  510 PRINT '" Insert the DESTINATION di
sc."
  520 PROCspcB
  530 PROCoscli("DIR "+pathS$)
  540 PROCdo72(read%,Rootcat%,2,&500)
  550 $(Rootcat%+&4F0)="CopyPact"
  560 PROCdo72(write%,Rootcat%,2,&500)
  570 PRINT '" Insert the SOURCE disc."
  580 PROCspcB
  590 ENDPROC
  600 :
  610 DEF FNrootdir
  620 LOCAL rootS$
  630 PRINT 'CHR$131"Enter the path name
 to the root SOURCE"'CHR$131"directory.
(RETURN only, for :0.$)"
  640 INPUT " : "rootS$
  650 PRINT 'CHR$131"Enter the same to t
he root DESTINATION"'CHR$131"directory.
(RETURN only, for :0.$)"
  660 INPUT " : "rootD$
  670 IF LEFT$(rootS$,1)="." THEN rootS$
=MID$(rootS$,2)
  680 IF LEFT$(rootS$,1)="$" THEN rootS$
=MID$(rootS$,3)
  690 IF LEFT$(rootD$,1)="." THEN rootD$
=MID$(rootD$,2)
  700 IF LEFT$(rootD$,1)="$" THEN rootD$
=MID$(rootD$,3)
  710 IF rootD$="" THEN rootD$="$"
  720 PROCoscli("DIR "+pathS$)
  730 PROCdo72(read%,Rootcat%,2,&500)
  740 seqS%=?Rootcat%
  750 =rootS$
  760 :
  770 DEF FNsectof(r$)
  780 LOCAL csd%,ptr%,found,l$
  790 IF r$="" THEN =2
  800 csd%=2
  810 REPEAT
  820 PROCdo72(read%,Rootcat%,csd%,&500)
  830 ptr%=Rootcat%+5
  840 l$=FNleft(r$,".")
  850 found=FALSE
  860 REPEAT
  870 IF FNupper(FNname(ptr%))=FNupper(l
$) THEN found=TRUE:csd%=ptr%!22
  880 IF (found=TRUE) AND (ptr%?3<128) T
HEN found=FALSE:ptr%=Rootcat%+&4B1
  890 ptr%=ptr%+26
  900 UNTIL found OR ?ptr%=0
  910 UNTIL r$="" OR NOT found
  920 IF NOT found THEN PRINT'CHR$7" Dir
ectory "l$" not found.":PROCspcB:=0
  930 =!(ptr%-4) AND &FFFFFF
  940 :
  950 DEF PROCtree(root$,sect%,dirs%)
  960 LOCAL aftdir%,ptr%,pathptr%,load%,
exec%
  970 pathptr%=LEN(pathD$)
  980 pathD$=pathD$+"."+root$
  990 PRINT '"Directory : "pathD$
 1000 PROCload(sect%,&500,Rootcat%)
 1010 VDU 13
 1020 title$=$(Rootcat%+&4D9)
 1030 PRINT  "Title : "title$
 1040 PROCoscli("TITLE "+title$)
 1050 aftdir%=dirs%
 1060 ptr%=Rootcat%+5
 1070 REPEAT
 1080 IF ptr%?0=0 THEN UNTIL TRUE:GOTO 1
120
 1090 IF ptr%?3>127 THEN aftdir%=FNcdir(
ptr%,aftdir%)
 1100 ptr%=ptr%+26
 1110 UNTIL FALSE
 1120 :
 1130 ptr%=Rootcat%+5
 1140 REPEAT
 1150 IF ptr%?0=0 THEN UNTIL TRUE:GOTO 1
190
 1160 IF ptr%?3<128 THEN PROCcfile(ptr%)
 1170 ptr%=ptr%+26
 1180 UNTIL FALSE
 1190 :
 1200 ptr%=dirs%
 1210 REPEAT
 1220 IF ptr%=aftdir% THEN UNTIL TRUE:GO
TO 1260
```

Continued ▶

◀ **Listing 1. CopyPact continued**

```
1230 PROCtree($(ptr%+4),ptr%!0,aftdir%)
1240 ptr%=ptr%+15
1250 UNTIL FALSE
1260 :
1270 PROCoscli("DIR ^")
1280 pathD$=LEFT$(pathD$,pathptr%)
1290 ENDPROC
1300 :
1310 DEF FNcdir(name%,nexdir%)
1320 LOCAL subdir$
1330 nexdir%!0=name%!22
1340 subdir$=FNname(name%)
1350 $(nexdir%+4)=subdir$
1360 nexdir%=nexdir%+15
1370 PRINT "  Sub Directory : "subdir$
1380 PROCoscli("CDIR "+subdir$)
1390 =nexdir%
1400 :
1410 DEF PROCcfile(name%)
1420 LOCAL attr$,len%,sect%,handle%,off
set%
1430 PROCinfo(name%)
1440 PRINT CHR$131 " File : "$Fname%;
1450 IF len%<=buflen% THEN PROCqcfile(s
ect%,len%,Buffer%):ENDPROC
1460 PROCcreate(len%)
1470 REPEAT
1480 IF len%-offset%<=buflen% THEN UNTI
L TRUE:GOTO 1530
1490 PROCload(sect%+offset%DIV256,bufle
n%,Buffer%)
1500 PROCsave(buflen%,offset%)
1510 offset%=offset%+buflen%
1520 UNTIL FALSE
1530 :
1540 PROCload(sect%+offset%DIV256,len%
MOD buflen%,Buffer%)
1550 PROCsave(len% MOD buflen%,offset%)
1560 PRINT
1570 PROCoscli("ACCESS "+$Fname%+attr$)
1580 ENDPROC
1590 :
1600 DEF PROCinfo(ptr%)
1610 $Fname%=FNname(ptr%)
1620 attr$=" "
1630 IF ptr%?0>127 THEN attr$=attr$+"R"
1640 IF ptr%?1>127 THEN attr$=attr$+"W"
1650 IF ptr%?2>127 THEN attr$=attr$+"L"
1660 IF ptr%?4>127 THEN attr$=attr$+"E"
1670 load%=ptr%!10
1680 exec%=ptr%!14
1690 len%=ptr%!18
1700 sect%=ptr%!22 AND &FFFFFF
1710 ENDPROC
1720 :
1730 DEF FNname(name%)
1740 LOCAL char%
1750 FOR char%=0 TO 9
1760 Temp%?char%=name%?char% AND 127
1770 NEXT
1780 Temp%?10=13
1790 =$Temp%
1800 :
1810 DEF PROCqcfile(sect%,len%,Addr%)
1820 PROCload(sect%,len%,Addr%)
1830 PROCstatus("Saving")
1840 PROCoscli("SAVE "+$Fname%+" "+STR$
~Addr%+"+"+STR$~len%+" "+STR$~exec%+" "+
STR$~load%)
1850 PROCoscli("ACCESS "+$Fname%+attr$)
1860 PROCunstat
1870 PRINT
1880 ENDPROC
1890 :
1900 DEF PROCcreate(len%)
1910 PROCstatus("Creating")
1920 Param%!0=Fname%
1930 Param%!2=load%
1940 Param%!6=exec%
1950 Param%!10=0
1960 Param%!14=len%
1970 PROCcall(osfile,7,Param%)
1980 PROCunstat
1990 ENDPROC
2000 :
2010 DEF PROCload(sect%,len%,Addr%)
2020 IF swap THEN PROCreqsrc
2030 PROCstatus("Loading")
2040 PROCoscli("DIR "+pathS$)
2050 PROCdo72(read%,Addr%,sect%,len%)
2060 PROCunstat
2070 IF swap THEN PROCreqdst
2080 PROCoscli("DIR "+pathD$)
2090 ENDPROC
2100 :
2110 DEF PROCdo72(op%,Addr%,sect%,len%)
2120 REPEAT
2130 Param%?0=0
2140 Param%!1=Addr%
2150 Param%?5=op%
2160 Param%?6=sect% DIV &10000
2170 Param%?7=sect% DIV &100
2180 Param%?8=sect%
2190 Param%!9=0
2200 Param%!11=len%
2210 PROCcall(osword,&72,Param%)
2220 UNTIL FNdiscerror(Param%?0)
2230 ENDPROC
2240 :
2250 DEF PROCsave(len%,ptr%)
2260 PROCstatus("Saving")
2270 handle%=OPENUP $Fname%
2280 Param%?0=handle%
2290 Param%!1=Buffer%
2300 Param%!5=len%
2310 Param%!9=ptr%
2320 PROCcall(osgbpb,2,Param%)
2330 CLOSE# handle%
2340 PROCunstat
2350 ENDPROC
2360 :
2370 DEF PROCstatus(txt$)
2380 PRINT TAB(19,VPOS)CHR$135 txt$'" L
oad=";~load%" Exec=";~exec%" Len=";~len%
;
2390 ENDPROC
2400 :
2410 DEF PROCunstat
2420 PRINT CHR$13 SPC39 CHR$11 STRING$(
19,CHR$127);
2430 ENDPROC
2440 :
2450 DEF PROCreqsrc
2460 SOUND 1,-10,53,6
2470 SOUND 1,-12,101,3
2480 PROCrequest("Insert SOURCE disc.")
2490 PROCchkdisc(seqS%,pathS$)
2500 ENDPROC
2510 :
2520 DEF PROCreqdst
2530 PROCrequest("Destination disc.  ")
2540 PROCchkdisc(256,LEFT$(pathD$,2))
2550 ENDPROC
2560 :
2570 DEF PROCchkdisc(seq%,drv$)
2580 REPEAT
2590 PROCoscli("DIR "+drv$)
2600 PROCdo72(read%,Clibuf%,6,256)
```

Continued ▶

◀ Listing 1. CopyPact continued

```
2610 IF seq%<256 THEN ok=(Clibuf%?&FA=s
eq%) ELSE ok=(FNname(Clibuf%+&F0)="CopyP
act")
2620 IF ok THEN UNTIL TRUE:ENDPROC
2630 PRINT CHR$7 "Wrong disc."SPC17;
2640 PROCspcB
2650 PRINT STRING$(28,CHR$127);
2660 UNTIL FALSE
2670 :
2680 DEF PROCrequest(txt$)
2690 PRINT TAB(19,VPOS)CHR$135 txt$ SPC
9;
2700 PROCspcB
2710 PRINT STRING$(28,CHR$127);
2720 ENDPROC
2730 :
2740 DEF PROCspcB
2750 PRINT " Press SPACE to continue.";
2760 *FX 15,1
2770 REPEAT UNTIL GET=32
2780 PRINT STRING$(25,CHR$127);
2790 ENDPROC
2800 :
2810 DEF FNleft(l$,sep$)
2820 LOCAL sep%
2830 sep%=INSTR(l$,sep$)
2840 IF sep%=0 THEN r$="":=l$
2850 r$=MID$(l$,sep%+1)
2860 =LEFT$(l$,sep%-1)
2870 :
2880 DEF FNupper(src$)
2890 LOCAL char%,char$,str$
2900 FOR char%=1 TO LEN src$
2910 char$=MID$(src$,char%,1)
2920 IF char$>="a" AND char$<="z" THEN
char$=CHR$(ASC(char$) AND &6F)
2930 str$=str$+char$
2940 NEXT
2950 =str$
2960 :
2970 DEF PROCcall(addr%,A%,X%)
2980 Y%=X%DIV256
2990 CALL addr%
3000 ENDPROC
3010 :
3020 DEF PROCoscli($Clibuf%)
3030 PROCcall(oscli,0,Clibuf%)
3040 ENDPROC
3050 :
3060 DEF FNdiscerror(err%)
3070 LOCAL err$,now%
3080 IF err%=0 THEN =TRUE
3090 PROCcall(osword,&73,Param%)
3100 err$="   Unknown error"
3110 IF err%<&60 THEN PROCerrhard ELSE
PROCerrsoft
3120 PRINT CHR$7 err$" at sector ";(Par
am%!6 AND &FFFFFF)".";
3130 now%=TIME
3140 REPEAT UNTIL TIME=now%+300
3150 IF err%>=&60 THEN PRINT'"Retrying.
" ELSE PRINT'"Continuing."
3160 =err%<&60
3170 :
3180 DEF PROCerrsoft
3190 IF err%=&60 THEN err$="      Bad co
mmand"
3200 IF err%=&61 THEN err$="      Bad ad
dress"
3210 IF err%=&63 THEN err$="    Volume
error"
3220 IF err%=&65 THEN err$="        Bad
drive"
3230 err$="Soft error ; "+err$
3240 ENDPROC
3250 :
3260 DEF PROCerrhard
3270 IF err%=&48 THEN err$="        CRC
error"
3280 IF err%=&50 THEN err$="Sector not
found"
3290 err$="Hard error ; "+err$
3300 ENDPROC
3310 :
3320 DEF PROCsyserror
3330 PRINT '':REPORT
3340 PRINT " at line ";ERL''
3350 IF (ERR=&D6) OR (ERR=&CC) THEN END
PROC
3360 PRINT CHR$14 CHR$26 TAB(0,24);
3370 END
```

See Strength of Resolve, page 73

**Listing 1. Fractal Trees**

*This program is used in conjunction with the HRdump listed on page 108. When run, it will produce a spool file called TREEPIC. This can be loaded into HRdump by typing 'TREEPIC' when prompted. The tree program is taken from Jim McGregor and Alan Watt's article,* Acorn User *December 1985.*

```
10 REM Fractal trees
20 REM by Jim McGregor and
Alan Watt
30 REM for BBC B/B+/M/C/E
40 REM (c) Acorn User Decem
ber 1985
50 :
60 MODE 7
70 PROCinitialise
80 MODE 0:VDU 23,1,0;0;0;0;
90 *SPOOL TREEPIC
100 MOVE 640,100
110 PROCtree(angle,branchfan
,height, depth%)
120 *SPOOL
130 END
140 :
150 DEF PROCinitialise
160 PRINT "Enter parameters
:"''
170 INPUT "rand : "rand
180 INPUT "branchfan : "bran
chfan
190 INPUT "inpafact : "inpaf
act
200 INPUT "branchdensity : "
branchdensity
210 INPUT "inphf : "inphf
220 INPUT "depth% : "depth%
230 angle=90:height=250
240 ENDPROC
250 :
260 DEF PROCtree(angle,branc
hfan,height,depth%)
270 LOCAL i,x,y,start,theta,
heightfactor
280 IF depth%=0 THEN PLOT 65
,-2,0:PLOT 65,2,4:PLOT 65,2,-4
:PLOT 0,-2,0:ENDPROC
290 start=angle-branchfan/2
300 theta=branchfan/branchde
nsity
310 IF depth% <= 2 THEN heig
htfactor=inphf/2 ELSE heightfa
ctor=inphf
320 x=height*COS(RAD(angle))
330 y=height*SIN(RAD(angle))
340 angle=start
350 FOR i=1 TO branchdensity
+1
360 PLOT 1,x,y
370 IF rand=0 THEN PROCtree(
angle,branchfan*inpafact,heigh
t*heightfactor,depth%-1):angle
=angle+theta
380 IF rand=1 THEN PROCtree(
angle-theta/2+RND(theta),branc
hfan*inpafact,height*heightfac
tor*(0.5+RND(1)/1.5),depth%-1)
:angle=angle+theta
390 PLOT 0,-x,-y
400 NEXT i
410 ENDPROC
```

# OFFERS

## THIS MONTH'S LISTINGS

For these cold winter days (and nights) we have included a lot of useful utilities on the December disc. For the BBC there is the first of the *August* programs; a Near Plotter Quality screendump; an ADFS *CopyPact* which is a disc copier, corrupt file copier and disc compacter.

Hints and Tips include an updated print screen program; a utility to give you eight colours in mode 1; a numeric key pad for the Electron; a program that enables you to use lower case key words in Basic and a *WIPE facility for ADFS.



For Arc readers there are all the programs from Arc Agora. There is also a GKS graphics library which allows mainframe style graphics to be produced on the Arc.

For owners of the Hybrid system we have included a piece of music by Ian Waugh. The 5.25-inch disc is only £5.95 while the 3.5-inch version is £6.95.

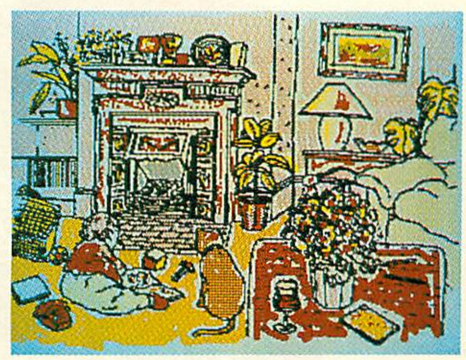
### *Winter utilities on the Acorn User disc*

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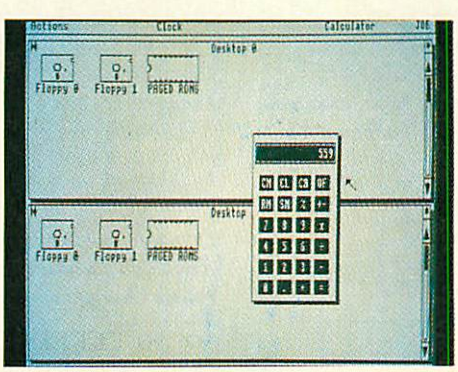


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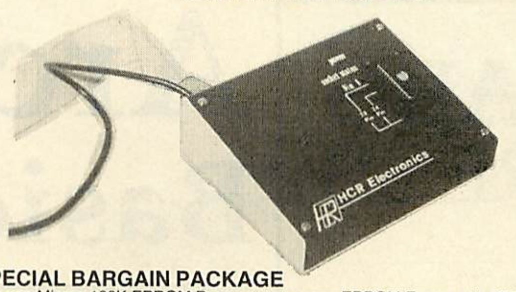
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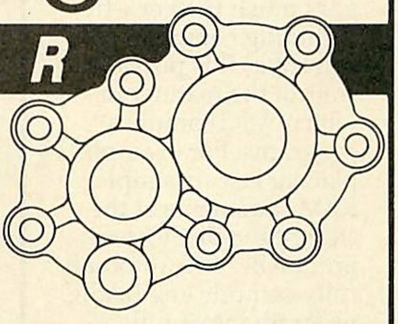
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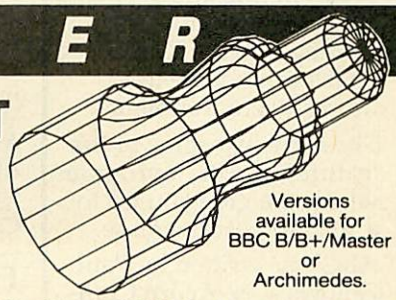


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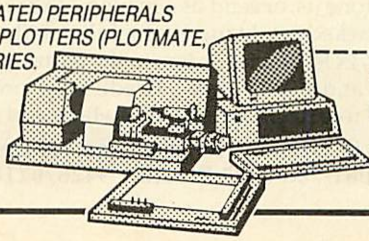
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**ABC – the Archimedes Basic Compiler** is the fast and powerful way to write instant machine code for experts and beginners alike – it's that simple!

ABC takes programs written in BASIC V and transforms them into super-fast ARM machine code at a snap and ready for immediate action. No more are you limited by the time consuming interpretive process, or the need to be 'in' BASIC to run your programs. A simple * command is all that is required after passing through ABC.

But the power of ABC goes much further – by including compiler directives it is possible to control the manner in which ABC compiles programs. For example, by placing just *six* simple REM statements at the start of the BASIC program ABC will automatically compile any BASIC program into a fully relocatable module for loading into the RMA which canthen be used from any environment.

These are just some of the features of ABC a program which can give you up to a 4000% speed increase.

ABC was written by Paul Fellows – ex-Acorn Computers and head of the team which wrote the Arthur Operating System and is excellent value at just £99.95 inclusive. Do we need to say any more?

# Archimedes Basic Compiler

## THE FAST AND POWERFUL WAY TO WRITE MACHINE CODE ACHIEVING SPEED INCREASES OF UP TO AND OVER 4000%!

The Archimedes Basic Compiler makes writing machine code programs and relocatable modules as easy as ABC! Programs can be developed and written using the full range of BASIC V's error messages and reports and once fully working, run through ABC which transforms them into machine code, ready for immediate action.

ABC is very easy to use and makes full use of Archimedes windows. Programs may be compiled from RAM or disc or using any combination of RAM and disc.

Just look at some of the advantages of using ABC:

- **Speed**: Compiled programs may run considerably faster than BASIC ones. As the benchmarks below show speed increases of up to **4000%** are possible!
- **Syntax errors:** Once a program has been compiled you can be sure that it is free of syntax errors. With the interpreter there is no guarantee of this.
- **Stand alone code**: The object program which is produced by the compiler is entirely "stand-alone" and could for example be used as a utility or library package by another application program. You can re-run the program or module later *without* either ABC or ROM BASIC being present.
- **Language Specification:** The compiler accepts BBC BASIC programs in their standard tokenised form making it possible to compile many programs directly with little or no modification.
- **Data Types**: Variables and arrays with up to eight dimensions of any of the three basic data types, integer, floating point and strings are supported.
- **Assembler:** The compiler allows use of the in-line assembler within programs.
- **Compiler Directives:** A wide range of compiler directives are built into ABC including simple commands which allow modules to be compiled. These directives are built into REM statements so that the modules may be fully tested in BASIC first.

**Sample Benchmarks**

| Benchmark | BASIC | ABC | Performance |
|---|---|---|---|
| GRAFSCRN | 1.68 | 0.84 | 200% |
| INTMATH | 0.19 | 0.02 | 950% |
| SIEVE – 1651 primes | 5.16 | 0.58 | 890% |
| TAK(18,12,6) | 27.53 | 0.78 | 3530% |
| FIBONACCI | 49.43 | 1.40 | 3531% |
| ACKERMAN(3,4) | 4.89 | 0.12 | 4075% |
| INT-ARRAY | 1.84 | 0.34 | 541% |
| WHILE | 13.11 | 0.40 | 3278% |
| REPEAT-UNTIL | 12.75 | 0.37 | 3446% |
| FOR-NEXT | 2.15 | 0.29 | 741% |

ABC is supplied with two discs including a disc full of example programs and two manuals – a 150 page Reference Guide and User Guide. The price is just £99.95 inclusive of VAT and postage and packing. **See us at The Micro User Show!**

**Archimedes Assembly Language**: 368 pages devoted to programming the Archimedes in machine code. At £14.95 this is the *only* book which deals specifically with assembler on the Archimedes. Book and programs disc £21.95.

**C: A Dabhand Guide.** The definitive guide to C on your Archie. 512 pages just £14.95.

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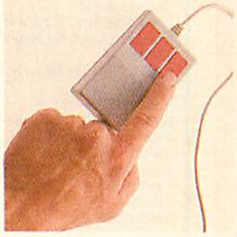
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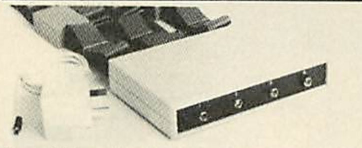
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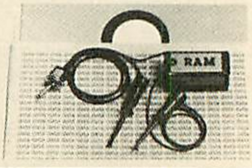



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# REVIEWS

## THE GAMES PAGE

# IN THE PIPELINE

**As well as letting us in on some cheats, Sam Greenhill looks at what will be around for Christmas**

This issue represents your last chance to catch up on games news before Christmas, as next month the famous annual games round-up takes place. But first things first.

Most games companies attended the Personal Computer show (the old PCW show) and if you did too, you will have noticed big names such as Superior and Tynesoft around the place. Tynesoft was displaying demo videos of *Superman* and *Circus Games*, its forthcoming release, while Minerva, set in a smaller stand, showed off *Freddy's Folly* and *Orion* – its latest pair of Arc games.

CDS was proudly displaying *Collosus Chess X*, its super chess game which will hopefully be out soon on the Arc – and watching the demonstrations made me wish it would be sooner. CDS's Dave Carlos handed me a press release with information of a joint enterprise between the company and Superior Software. The agreement means that CDS now has publishing rights to 15 of Superior's titles, all of which will be sold on the budget label. On the subject of Superior's ventures, the company has recently taken over the Alligata label, and has acquired the rights to several games, including *Olympic Decathlon* and *Guardian*.

I have a small complaint to make before I continue: software houses should be more cautious about reconfiguring Archimedes' with their games. It has become a real problem with my Arc – every time I run certain games I find different values have been issued to the machine's configuration status. Some software doesn't even provide warnings to let you know what it's doing. It should be standard practice to inquire whether the user wants his or her machine reconfigured or not, and only then go ahead and prod and poke at the battery-backed RAM.

Back to the lighter side of life, Simon Poliakoff from Nottingham has found a way to triple your energy supply in Superior's *Quest*. If you press the keys R, E, I, N, C, A and T simultaneously when you've lost your energy, the computer asks if you wish to be reincarnated.



***Lancelot*** **for the BBC will be reviewed next month – this is the Atari version**

Superior's Steve Hanson has told me about a way to skip the first level in *Pipeline*. If you've already completed it without losing any lives, pressing 'S' when it asks you to 'press Space to play' will take you directly to level two.

Minerva's *Orion* – reviewed this month – has a built-in cheat mode. It can be accessed from the high score table by simultaneously pressing L, U and C along with the space-bar. The cheat mode allows you to access any level and provides 10 lives and 10 smart bombs.

As with the *Time and Magik* trilogy, Mandarin's *Lancelot* adventure will not be available for the Archimedes. For Master users the game is not going to cause too much hassle but if you own a Beeb, then I'm afraid it's the old story of having an 80-track drive and sideways RAM, etc.

Elite, of *Commando* fame, is making an appearance on the BBC market after some time, with a computerised version of television's *A Question of Sport*. The conversion faithfully reproduces features that many sports fans will recognise, including the picture board, home and away and the 'what happens next?' quiz.

Domark is gathering pace for the season of goodwill with sequence number two of *Star Wars*. No prizes for guessing the title. Also, bad news for *Spitting Image* fans; the game, which is available for other machines, is not planned for either the Archimedes or the BBC.

Dabs has two new Arc games in the pipeline, one of which is a compendium by *Acorn User's* 'David Lawton'. Known at present as *Arcendium*, the package will comprise a collection of two well-known board games, namely draughts and backgammon, and two less famous ones, Reversi and Quad-Line, a version of Connect Four. The compendium will feature digitised speech and sound, and will have a Save/Load option for each game. Backgammon is apparently going to have 3-D rolling dice, and all the games should be compatible right across the range of Arcs. Look out for it in November.

The second game is written by Felix Andrew and will be called *Aliped*. It's a graphic adventure with a difference – animation is involved, and I'm told that it will be vaguely reminiscent of the plot of *Castle Quest*. Dabs is aiming for a Christmas release.

While on the subject of Felix, I did him an injustice in the September issue. He's not new to the Beeb games market at all – in fact he's quite an old hand. And Dabs' *Alerion* game is now only £2 more than *Quazer*, which is sold by Impact Games.

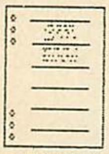
Impact has compiled a host of cheats for use with many BBC games, good enough to provoke opening the dusty cupboard and taking out rotting games discs to finish those annoying final levels. '*Cheat it again, Joe*' seems pretty good value at £3 a tape – £5 a disc for more cheats.

That's about it for the month but miss the next issue's 1988 top ten and it could be your last act!

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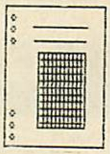
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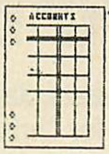
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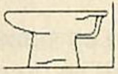
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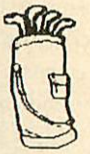
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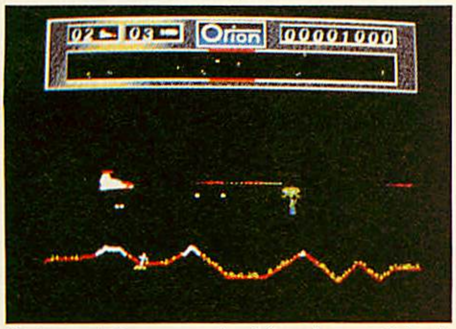
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# GAMES

## BLASTING OFF



**Orion; Minerva, Archimedes, 3.5-inch disc, £14.95.**

After several tentative steps into the Archimedes game market, Minerva has finally come up with the biz. *Orion* falls safely into the 'blast everything before it blasts you' category. The one exception are the humanoids that inhabit the planet – of which you have been designated sole protector. If all this sounds familiar, you're probably one of the thousands who have already spent many an hour zapping the pods, baiters and landers that inhabit the original Acornsoft game, *Planetoid*.

*Orion* shows exactly what makes a good game; addictiveness and playability. On top of this, the graphics are perfect for the game. Not complicated or fussy, but small and recognisable. All the sprites are nicely animated; especially the humanoids who wave franticly at you when being carted off by the landers.

The sound effects, though good, seem out of place in the game. Everybody knows that lasers don't make any noise. although one would hope that if they did, it would be something a little more exciting than a 'squeak'. Other effects sound as if they have been 'borrowed' from recent albums. Could this be the start of Stock, Aitken & Waterman on the Arc?

Gameplay is almost identical to *Planetoid*. One difference is that your ship slows down much quicker, making really tight turns possible. You have no excuses now! Minerva has even had the bright idea of using the same keys as on the original Beeb version. There is no facility to redefine them, although this should be no problem for the hardened Planetoidophile. That game was, and has, remained one of the most enjoyable and playable games ever on the BBC micro. Being an almost indentical clone, *Orion* is excellent and for my money, the best shooting game on the Arc so far. Even the current shoot-em-ups on other machines, with their complicated scenarios and detailed missions, have difficulty matching this one.

PS. Do I get a prize for finding the cheat-mode?

Rob Miller

## A QUESTION OF SPORT

**Summer Olympiad; Tynesoft, Electron cassette, £9.95, 5.25 and 3.5-inch disc, £14.95.**

*Summer Olympiad* starts off well with a pleasant loading screen. The game comprises five different events, each divided into three rounds; fencing, triple jump, skeet shooting, hurdles and diving. It allows up to four players, but you don't get a chance to compete against each other. The main objective of the game is to compete in each event, winning either a bronze, silver or gold medal. At the end of each round, the score table is displayed and at the end of round three the main score table is shown. If you are not entirely satisfied with your performance, the computer offers you a chance to replay the event.

There's also a nice set of loading screens separating each event, but of course this does add to the loading times. The events themselves are quite addictive, as they require a lot of skill and accuracy. The first sport is fencing and has a time limit. If you're good, this should be no obstruction – three stabs and you've got it made! In the triple jump you have to hammer the Z and X keys to pick up as much speed as you can, and you only have 30 metres in which to gain it. The skeet shooting is quite hard at first, as you find yourself trying to shoot two projectiles at the same time. But once the keys are mastered it becomes a lot easier. The two remaining events – hurdles and diving – maintain the quality of the others but one thing I disliked about the game as a whole was all the fuss about formalities. For example before most events it plays a tune, waits for you press the space bar and then prints 'On Guard'. This can become quite a nuisance!

Overall I found the game addictive and enjoyable, although I haven't yet won a gold medal – not bad Tynesoft!

Mark Elmer

## A RIGHT OLD BASH

**By Fair Means or Foul; Superior, BBC and Electron cassette, £9.95, 5.25-inch disc, £11.95, 3.5-inch disc, £14.95.**

About two years ago Superior announced that it was working on a boxing simulation in which you could cheat if the referee wasn't looking. Unfortunately it never quite got off the ground – until now. *By Fair Means or Foul* explores life in the ring with another man trying knock off your head. Two people can play each other, or one person can compete against the machine. Hopefully, by bashing your friends you can gain enough experience to take on a computer-controlled expert assailant in the world championship.

Set in a three-dimensional boxing ring illuminated by a sharp cone of light, with the roaring crowds in the background and the referee dancing up and down, *By Fair Means or Foul* looks OK. At random points during the fight, a member of the crowd will yell out comments such as 'chicken', to add to the atmosphere. The usual set of 16 manoeuvres is obtained through the various combinations of four control keys plus a 'punch' button. Joysticks can also be used, along with a blend of joystick and keys. The sprites aren't particularly detailed, but do their job, and the same applies to the sound.

The manipulation of your boxer's limbs is fairly easy to master, and within two minutes of loading the games you can be engaged in a bout of combat.

I suppose that the morals behind a game that encourages cheating in sport are questionable, but blows to painful and illegal areas such as the groin are what makes the game amusing. But if the referee isn't having his attention distracted by the crowd, you could be in big trouble.

Overall I think the game is *Barbarian* in disguise. But if you don't have *Barbarian*, or if you do but are a born sadist, then *By Fair Means or Foul* isn't bad.

Sam Greenhill

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# ARC ON LINE

**At last, there are now some comms packages for the Archimedes – and good ones at that. Ian Burley examines two of the best**

Getting an Archimedes online has always proved to be a struggle, because of hardware bugs experienced with the 6551 serial chip chosen by Acorn. With the advent of Arthur 1.20 it was virtually impossible to get any comms programs to work reliably.

Acorn finally developed version 1.24 of its serial line driver earlier this year, which fixed the bugs. It comes with both of the packages reviewed here. Despite the delay while Acorn toiled to provide the fix, enthusiasts trying to make the Archimedes a versatile and powerful comms terminal weren't completely put off. To date, four main packages have resulted, Synchrotech's *Deputy*, Magenta Research's *U-Connect*, and the two packages we're examining here : *ARCterm* 6.01 from The Serial Port and *Hearsay* from Beebug.

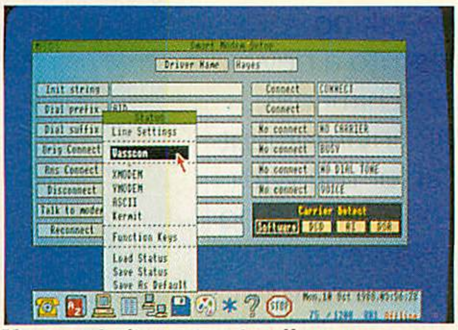
There is one certainty about the two packages reviewed – they represent the best comms solutions for the Archimedes. Exactly which is 'better' depends entirely on your personal requirements. The packages were designed from very different points of view, and so have different advantages and faults. I wouldn't hesitate to recommend either package, but I would insist that any prospective user compared the two side by side before deciding. Both packages require at least 1Mb of RAM: if you have a 305, then a memory upgrade will be necessary. See David Watkin's article in September's *Acorn User* for details of how to do this simple upgrade.

Beebug is no stranger to the world of comms, having produced the widely-respected *Command* ROM for eight-bit Beebs. *Command*'s author, David Pilling, has moved on to the Archimedes, and written *Hearsay*.

Beebug decided that *Hearsay* would be Wimp-based, making use of the mouse obligatory. This introduced a challenge when it came to designing the Prestel/Viewdata terminal software, as it wasn't feasible to use the standard mode 7 teletext screen emulation of the Archimedes. The current Wimp system only works properly




***Hearsay* uses its own mode 7 emulation**



**Menus make it easy to set up *Hearsay***



***ARCterm's* dialling directory**

in mode 12 – although the new RISC OS operating system due in April 1989 solves this. But for Beebug, it's turned out to be a blessing in disguise, as Archimedes' mode 7 is a poor facsimile of the old Beeb's mode 7. It suffers from jagged and chunky character definitions, and the display is relatively slow. Therefore *Hearsay* has a windowed three-quarter width viewdata screen emulation designed from scratch.

Extensive use of pop-up menus has been made for the dial-up directory of numbers that you call, and for functions like modem configuration, file selection, parity and baud rate selection, file transfer protocol selection, and status displays. At the base of the screen is a permanent status and icon bar. Three lines of status information are given: the date and time, the elapsed time online (this can be switched to show the number of phone units used), and the line status. The last includes the transmit and receive baud rates, word format setting (eg seven bits even parity and one stop bit – 7E1) and an on or offline indicator. An optional serial port control line status indicator is also available.

The telephone icon brings up a short menu enabling online connection, disconnection, and dialling a named entry in the dial-up list. This directory hides behind the A-Z box in the form of a scrolling window about two screens wide. It will hold the name, phone number, terminal type, call charge rate, and log-in strings for each chosen on-line host you access regularly. For a couple of dozen of the most common services, complete entries are supplied.

The terminal icon enables emulation of any one of the following terminals: Viewdata, ANSI, VT220, VT100, VT52, Tektronix (for vector graphics), Teletype 40 and Teletype 80.

The sheet of paper icon is a status window – it lets you select line settings, by V numbers (V21 and V22bis for example) or line speeds (300 baud or 2400 baud), select between originate and answer mode, define parity, and so on. You may select Vasscom error protection on Prestel, to eliminate the effects of line noise, plus configure file transfers and function key settings.

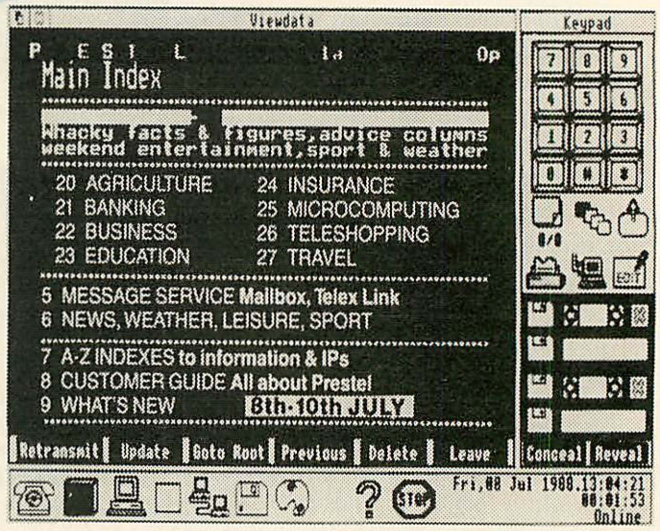
The computer to computer link icon enables file transfer protocol selection. You can choose XMODEM, YMODEM, YMODEM Batch, SEAlink, Ascii or Kermit with either send or receive options. The XMODEM option caters for all the commonly used variations of this protocol, and will automatically sense the correct type, though block sizes and block check types can be manually selected as well. File

"Quite simply, Hearsay is visually stunning and extremely effective."
"Beebug has done an excellent job. . ."
". . . Hearsay can be wholeheartedly recommended."
MICRONET Aug 1988

# BEEBUG HEARSAY

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## SOFTWARE

selection is done with the disc icon. The same menu is used by various functions like file transfer, and lets you click on a filename in the displayed catalogue or enter a new one at the keyboard.

The paint palette is an odd choice of icon for the general setup menu, especially as it can be confused with the Archimedes' desktop icon that allows you to adjust the colour of the screen. First is the 'general' window which lets you select your printer type, including plain, Epson or IBM-compatible graphics. You can switch the sound on or off (to signify the end of transfer operations for example), and call logging on or off, etc. This latter feature keeps a diary of the host systems you are connected to, so you could work out what your phone bill should be.

Also accessible from the palette is the modem driver menu, where you can select from a standard dumb modem, through Hayes and various other smart modem configurations, or even an Archimedes internal modem podule. This should cater for almost everyone. The serial line status display is also selected from here. Of course you can edit modem drivers, and specify either software or control line, connect detection, dial command strings and so on for your particular type of printer.

Finally we have the *Hearsay* screen colour adjuster, similar to the ordinary desktop palette icon. The final icons are for access to the operating system and to leave the program. *Hearsay* is complex but well organised, and after a while everything fits into an understandable framework, and the mouse is exploited extremely well.

The author of *ARCterm* is Hugo Fiennes – still at college and a dedicated comms fanatic. He has his own Amiga-based bulletin board, the World of Cryton, and anything Hugo has a hand in seems to be peppered with his wry sense of humour. From who else would you expect a comms package with an animated credits screen accompanied by an infinite loop of quite impressive sequenced music? Keep an eye out for the proverbs and general witticisms scrolling at the bottom of the screen – they're a real laugh. And the mouse pointer in *ARCterm* is distinctly Amiga-like.

But beyond the quirky intro, you're faced with a professional comms package. Hugo's priority seems to be speed rather than the ease of use espoused by *Hearsay*. A practised *ARCterm* user will be able to bounce in and out of various functions within the program in a very slick manner, but the price to be paid in terms of learning time is relatively high. I still find it difficult to use, even after a couple of weeks.




**ARCterm: even better mode 7 emulation**

Another Archimedes program which makes extensive use of ALT key commands, the *Pipedream* WP and spreadsheet from Colton Software, breaks the commands sensibly into six distinct groups, with well-selected mnemonics for each function, plus there's full menu backup. But *ARCterm* doesn't take this approach, and the key-sequences are difficult to learn.

However, initial ease of use put to one side, *ARCterm* is certainly extremely impressive in a variety of ways. Once again, as in *Hearsay*, the Archimedes mode 7 teletext emulation has been ditched in favour of a completely redefined screen with properly rounded characters. In fact, *ARCterm*'s viewdata emulation is better than *Hearsay*'s. The viewdata section was put together by Jan Paxton, who has also included a powerful mailbox editor, complete with circle, box, line and doodling options as well as cut and paste to individual alpha-mosaic pixel resolution. At present there is no Vasscom error protection offered. The author has suggested that some lower level MNP (Microcom Networking Protocol) error protection could be added later.

Besides viewdata, *ARCterm* offers a standard scrolling terminal, VT100 and VT52 emulation, ANSI colour, a special scrolling teletext specifically for BBC micro-based bulletin boards offering mode 7 support, and some utility modes to show incoming data as hex or to highlight control codes. The version of *ARCterm* I reviewed did not appear to have a Tektronix 4010 vector graphic emulation – surprising as *ARCterm* is aimed at schools and colleges with access to mini and mainframe computers.

As for the screen display, all the terminals, including viewdata, feature a status bar at the top of the screen. Besides informing you of obvious program states, it serves to countdown log-in timeouts, tells you the current number dialled, filter, spool, and printer on/off status, and little red blocks flash on and off in time with incoming and outgoing characters.

File transfers are amply provided for with XMODEM, XMODEM CRC, ZMODEM, Y/XMODEM 1K, Y/XMODEM CRC 1K, YMODEM batch, YMODEM-g, Ascii, Kermit, SEAlink sliding windows and CET Prestel-compatible telesoftware. You can also format data into telesoftware frames for uploading, useful for Prestel information providers or Micronet Gallery users. For Archimedes person-to-person transfer, *ARCterm* has ARCfer, a customised error corrected file transfer system which transfers file names, attributes and data.

*ARCterm* is the product of a programmer who obviously cares for and uses his own program. For example, there is a 255-character pop-up notepad which appears on the status bar to let you jot down information while online. Call logging tells you how many times a certain service has been accessed and for how long.

You can position the pop-up windows either to the left, right or centre of the screen. Spooling to the printer is aided by a built-in printer buffer of up to 128k if required.

There is a host mode for easy remote access to the computer's files, through which files can be up and downloaded. Although it's not as comprehensive as a full bulletin board system, as a personal access system while you're away, or for friends to leave messages and programs, the host is ideal. All access is password protected.

*ARCterm* has its own command or 'scripting' language, complete with an automatic learn mode, almost a mandatory requisite of expensive professional comms packages these days. It allows you to write 'scripts' like programs, that can log on to a service on their own, download all your mail and then log off. The language,

ARCscript, has a selection of keywords, such as TYPE (transmit a given string or character), LISTEN FOR (wait for given string like a prompt to arrive), HANGUP, CALL, SET TERMINAL (followed by which type), OPEN a file for READ and WRITE, HOSTMODE and so on. Decision-making is catered for by IF..THEN..ENDIF, WAIT UNTIL/FOR, and REPEAT..UNTIL. The language has great potential and not only offers the convenient automation of oft-repeated command sequences, but offers possibilities for logon-download-logoff routines, customised host modes and bulletin boards.

The nice thing about *ARCterm* is that almost anything can be done from the main configuration menu. With *Hearsay* you have to switch from one menu to another, which can be confusing. However, Beebug has done a fine job with the use of menus and it's possible to select everything and log on by touching only the mouse.

*Hearsay*'s viewdata terminal is largely excellent, though it is let down by a cursor which disappears as it moves around the screen, and an otherwise impressive editor which suffers only from not being quite as good as *ARCterm*'s.

Both packages offer character and line insert and delete, a freehand doodle mode and block cut and paste. *ARCterm* expands on this by providing circle, box and line drawing, plus a horizontal line fill function. Curiously there is no true block move facility, you have to go the long-winded way by cutting an object, deleting the original image, and repasting where required. The way *ARCterm* marks its block and drawing movements can be a bit fiddly too, but it is possible.

Online in viewdata mode, *Hearsay* feels better, despite *ARCterm*'s nicer screen emulation. Put simply, Beebug has made much better use of the mouse, offering a full numeric keypad window to click on and icons for tagging pages, printing frames, etc. *ARCterm* was the originator of the now virtually ubiquitous reply to mailbox facility, automatically sensing a sender's mailbox number and keying it in for you on your chosen mailbox reply page. The latest version of *ARCterm* lets you choose the mailbox number with the mouse pointer, but it's not as flexible as *Hearsay* because you must click on *the* first digit of the number.

Outside the viewdata section there isn't much to choose – I'd expect *ARCterm* to be slightly more complete in some of its terminal emulations, and the nice touches include the ARCfer protocol and the inclusion of the 'ARC' file compression utility originally produced for IBM PC comms packages (it has nothing to do with the ARC itself). In fact the ARC utility found in *ARCterm* was written by Beebug for the public domain, and is included free on the *Acorn User* 3.5-inch monthly disc.

I suspect that comms enthusiasts and aspiring 'hackers' will go for *ARCterm*. It's a challenging piece of software and full of little surprises. *Hearsay* is fine example of the use of Archimedes Wimps, easy to use, if a bit gaudy on screen (the colours can be altered). Both are extremely capable, and come thoroughly recommended.


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Access

# SIGN OF THE TIMES

**Kevin Kealy looks at *Signwriter* – a package to produce high-quality posters and notices**

The *Signwriter* package is a cut-down version of a poster-size printing utility that's well established on computers like the IBM PC – a fact that is stressed heavily in the documentation. It costs £29.95 and is supplied in a sturdy plastic folder; in my case it came on a 5.25-inch 80-track floppy. Extra fonts on separate discs cost £5 each. There are a number of modules to the software, for text entry, print-out, font design and there's a section to allow you to configure the software for your hardware set up.

It is intended to allow you to print your own signs, for advertising, information or any other possible purpose. The whole tone of the manual seems almost apologetic of the fact that it had to be cut down to BBC size. Why this should be so, I can't imagine, as the software produces signs and images of an incredibly high quality.

I found the manual informative, although it could have done with an index. Once I had read the important bits, I put it aside and forged ahead with the package. The first thing you see is a Wimp-style front page, which is clear and well presented. Choosing an option leads to a series of pop-up screens, which set various options that affect how your sign will look, whether you want a horizontal or vertical border on the page, for example.

Once into the text-entry mode, you type text for your poster line by line. Special options for each line can be set up – size, underlining and so on. You have limited editing facilities for this text, and you can add non-keyboard characters by entering their character numbers. I found this aspect very limiting, as once you had finished your text, you were given no option to edit it – if a line was too long, bad luck. Your only choice is to go back to the beginning and start again, until you get it right.

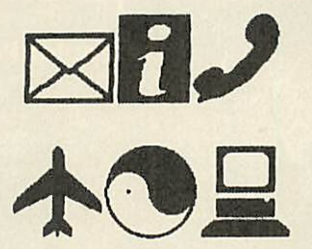
I could find no fault with the print-out quality; the manual warns you that it will not be quick (about 15 minutes for an A4 poster of moderate complexity), and bearing this in mind, I left the computer to its own devices. The result, even in 'draft' mode, is quite stunning. No matter what the size of text, every letter is perfectly formed, and needs no 'touching up', as in *Pagemaker*. It's not chunky – curved letters are perfectly smooth.

Even with my humble set up – standard model B, with an Epson FX-800 printer – I was able to achieve high-quality posters, signs and abusive messages. If you are on a limited budget but need to produce your own headlines or signs, then this package seems to fit the bill (pun intended!).

Having put signs on nearly every door and cupboard, I decided to try the other font discs. I read the manual, and reread it.

**This text is in full quality printout.**

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**Examples from the Icon font**

Still no reference to other fonts. In the end, I tried booting a font disc. Bingo – up came the identical program. Each extra font disc has the complete suite of software, plus a textfile of instructions, so I quickly got the hang of using them. My house now has all manner of signs on every possible article!

There are a few criticisms; I feel that the font designer part of the package should default to the current font not the start up font on the original disc. And each new font disc has to be configured like the original. There should be some easy way to carry the configuration across to each font disc. It is also very fiddly to try to combine fonts on the same line, as you have to print the first, wind the paper back, and then run another font disc.

These minor points aside, the package was quite easy to use, and the print-out quality was so good that I can easily forgive the minor quirks. It may seem a bit expensive, but for anyone who needs to produce good quality lettering, it is a must. Do buy the Icon Font as well; some of the pictures are excellent!

## ● Arc version

Wight Scientific also produces a version of *Signwriter* for the Archimedes. Functionally it is the same as the PC version, and comes with the same manual, a function key strip and supplementary notes for Arc users. Copying the master disc onto two blank floppies is simple, one for sign creation, one for printing.

The Arc version is considerably slicker than that for the BBC model B. The inputting of the sign data is similar, with options for height of the letters, spacing, orientation and font details. But editing of the text is much better than the Beeb version. In fact, it is almost like a word-processor, with options to insert and delete lines, words and letters.

Once you have typed in the text, the production of the sign is much quicker: this is because the Arc calculates what to print much faster. Each font is stored as a series of letter outlines – and that requires a lot of processing.

The eventual output quality of signs produced from the Arc is identical to those from the BBC B: the text below is shown at full size. It is more expensive than the BBC micro version but still represents fair value for money.

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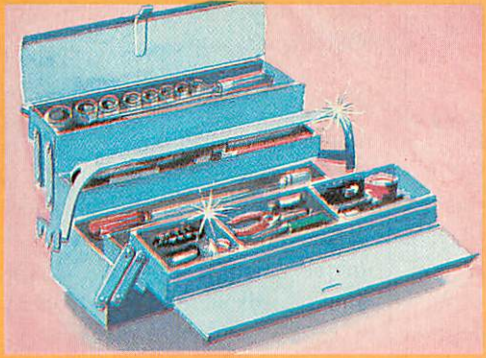
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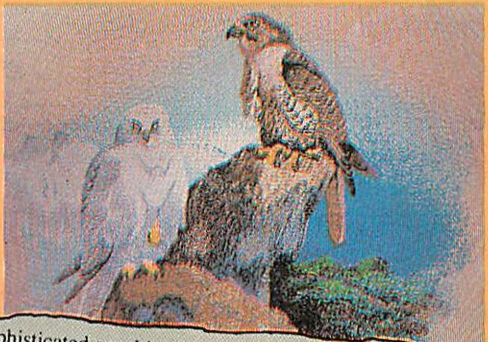
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*A & B December 1987 & January 1988*

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# ABANDON SHIP

**Everyone is familiar with the tragedy of the Titanic, but Dave Futcher has discovered a package that brings the experience right into the classroom**

Despite the passage of time, the terrible events of April 1912, when the *Titanic* hit an iceberg and sank, still fascinate both young and old alike.

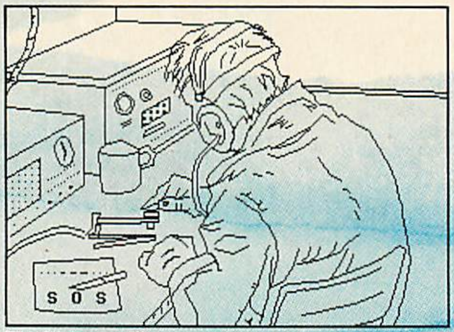
*Titanic*, an extensive information technology resource pack from ESM, will bring the intriguing story right into the classroom. The pack offers a chance for children to research the liner's launching, her sinking in April 1912 and her discovery and exploration on the seabed by Robert Ballard 73 years later.

Many educational software packages attempt to reconstruct a specific historical incident. Two of the best known are *The Mary Rose* in which the Tudor warship is found in the Solent and excavated, and *Expedition to Saqqara* where an expedition to one of the most important archaeological sites in Egypt is mounted.

The *Titanic* pack has been designed as a set of four modules. The first of these provides the background for the rest of the material. There are three separate computer programs and a set of linked work cards.

*The Story* provides a factual account of the tragedy, in a series of teletext pages and high resolution graphics screens. The story can be paused, which allows time for discussion or for children to work at their own pace. The graphics are effective in setting the scene.

'Titanic: The Facts' and 'Teletext 1912' are both teletext simulations. Although television didn't exist in 1912, 'Teletext 1912' is a serious attempt to create a



**The ill-fated *Titanic*'s SOS is transmitted**

complete teletext channel for April 15, 1912. There are news stories of the day, as well as sports information, details of holidays and prices of the time.

'Titanic: The Facts' contains a host of interesting but well-known details about the *Titanic* – the number of millionaires on board, for example – and some that are not too well-known, such as details of the Princess of Death. It's a creative and imaginative use of teletext.

The second of the four modules, *The Databases*, is an outstanding collection of historical material. The disc provides a database manager and two files that allow you to check on all those people who sailed with the *Titanic*.

The database has been specially written and it is menu-driven, quick and easy to use. A typical complex search on eight fields takes less than a minute. The accompanying manuals have step-by-step sample searches and 20 illustrated work cards. Many teachers will value this tutorial style.

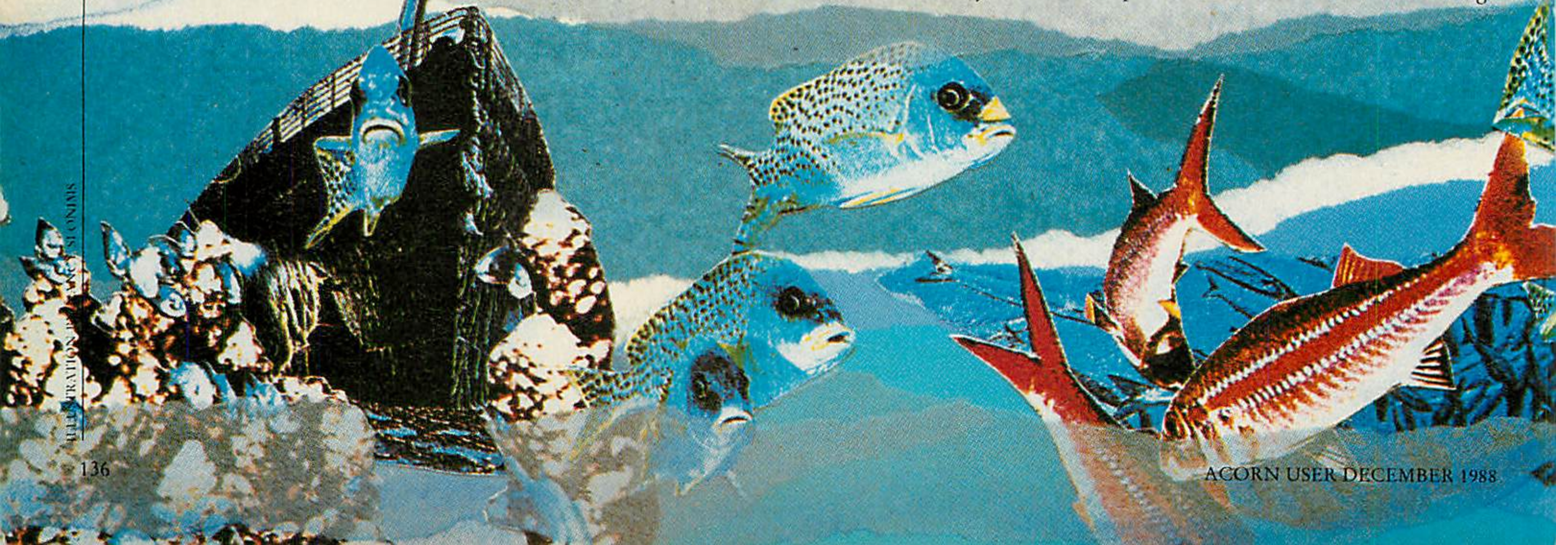
'The Passenger Database' contains over 1300 records with eight fields. Each record includes a passenger's name, class, port of embarkation and whether or not they survived the tragedy. There is an additional comment field, which says whether the person was a millionaire or professional boxer, for example.

'The Crew Database' has over 900 records with details of name, sex, address, rating, pay and so on.

Package author, John Doherty, has spent a considerable time collecting and verifying all the information that makes up these unique datafiles. Both the passenger and crew records were collected from a variety of sources – the *Titanic*'s passenger and crew lists held at the Public Record Office at Kew in London, books, newspaper clippings, and magazines.

Without a doubt he's produced a first-rate information source and, in the process, shown that many of the official records contain a number of inaccuracies.

The database module is a superb educational resource. Children quickly begin to develop empathy with the people listed. This was especially the case when tragic stories of separated families – that they had read about in other modules – were made 'real' by the children's own deductions from the records. There is no doubt that this particular module will give children understanding of the disaster and the social and material conditions of people on board the ship. Harder information-handling



skills are thoroughly developed by using this module. There's access to real data for discussion and hypothesis testing, and it provides for all sorts of related follow-ups: graph making, creative writing, poetry, art and craft, for example.

The third module, *Titanic Simulations*, is made up of two programs based on the rediscovery of the ship. 'The Search' simulates the discovery of the wreck in September 1985 by Robert Ballard of the Woods Hole Oceanographic Institute. In the simulation, children navigate a ship called *The Knorr* around a specific area of the Atlantic, videotaping the sea bed with an underwater camera.

A red X marks the last reported position of the *Titanic*. This is not where the wreck is to be found. Due to a navigational error, the ship's radio officer gave the ship's position wrongly – it had sailed further west than reported. This is one of the reasons that the wreck remained undiscovered for so long.

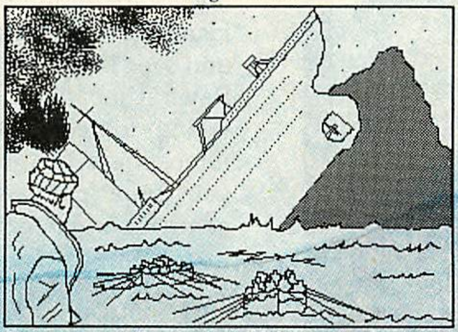
As the ship broke its back when it sank, bow and stern lie separately. It's great to watch the expression of children when the screen at last shows pictures of either the bow or stern sections of the wreck. Children who used the package with me were probably just as excited as Robert Ballard was on September 1 1985.

'The Exploration' simulates dives to the bow and stern sections of the ship in 1985 and 1986. *Alvin*, a mini-submarine, has to be navigated around either of the two sections of the *Titanic*.

You have to keep an eye on the oxygen supplies too, as *Alvin*'s air can run out. If you ignore the low air warning, a message appears telling you that you will have to spend the next day recovering – you miss a day's dive.

The computer keeps a record of each group's progress in locating the 20 different objects at each site. When children find an object, a full description and drawing of the find can be obtained from the Resources Pack.

Like the previous three modules, the simulations are supplemented by illustrated workcards which cover different aspects of the expeditions. They are of the highest quality, enabling teachers to set children tasks linked with the simulation. There are some outstanding ideas offered that really fire children's imaginations and set them off on some exciting tracks.



**Survivors see the 'unsinkable' liner go down**

When using these, I soon found a corner of the classroom set up as a radio studio, with one girl interviewing another child playing Robert Ballard after he had found the *Titanic*. It really sounded like the *Today* programme!

The simulations and the follow-up work enable a tremendous amount of cross-curricular study. But what I was especially pleased with was the standard of the creative writing that it fostered.

Many teachers will find the time limits built into the search and exploration phases easier to use than other open-ended simulation programs. It does ensure an equal share out of computer time, and forces groups to work away from the computer too.

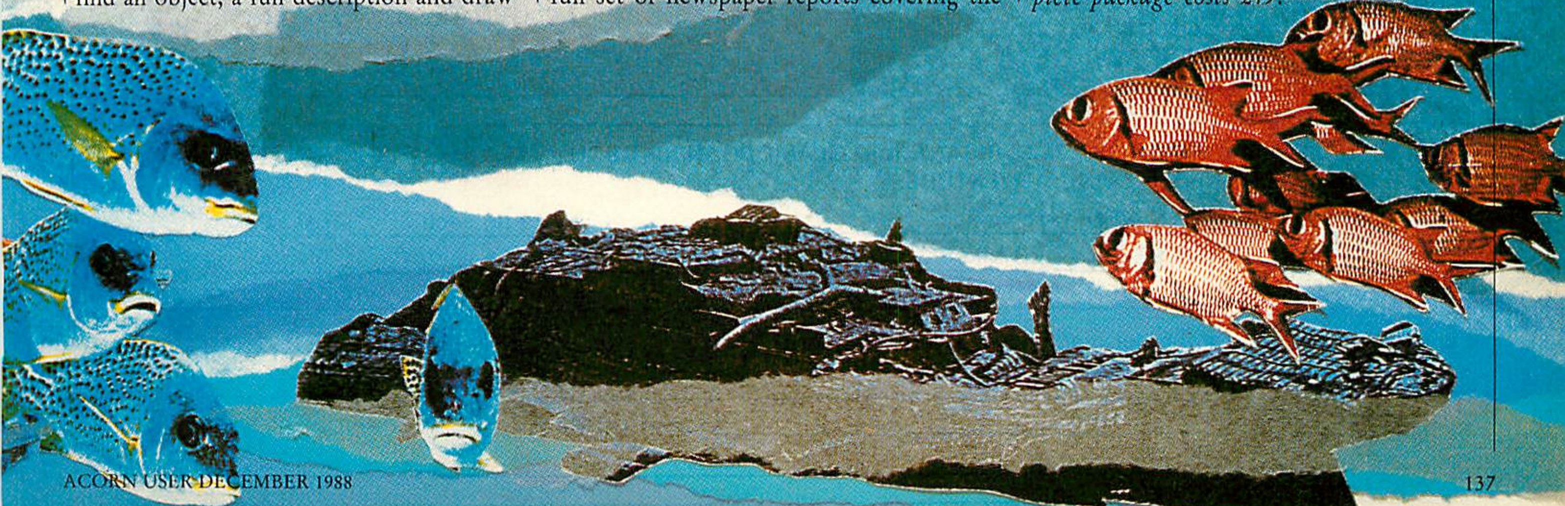
The final module is *Titanic Reference Materials* but it doesn't have computer content at all. There is a well-produced set of 40 A4 reference cards. The range is amazing – menus from the dining rooms, a full set of newspaper reports covering the sinking, details of the lifeboats and of the *Titanic*'s captain, reprintings of various telegrams and extracts from the court of inquiry's findings.

In addition, a collection of memorabilia is provided. There is a set of amazing postcards – reprints from the originals. These include action pictures of other White Star liners, the launch of the *Titanic*, pictures of the ship's interiors and a number of memorable postcards. The most moving piece of material is a reprint of a contemporary account of the terrible tragedy entitled *The Deathless Story of the Titanic* by Philip Gibbs, written in the emotional prose of the time. Another useful resource is Michael McCaughan's 32-page pamplet called *Titanic*, which was published by the Ulster Folk and Transport Museum in 1982.

*Titanic* is one of the most extensive educational computing packages yet produced. Despite its size and tremendous scope, it remains easy to manage. It is a pack with a range of different types of software – simulation, database, teletext material – and there is sufficient material and work for a whole class. The hundreds of activity and workcards help bring structure to the children's studies. Above all, *Titanic* gives children the opportunity to work with real historical evidence. It provides a very rich source of cross-curricular work in reading, writing, history, geography and mathematics.

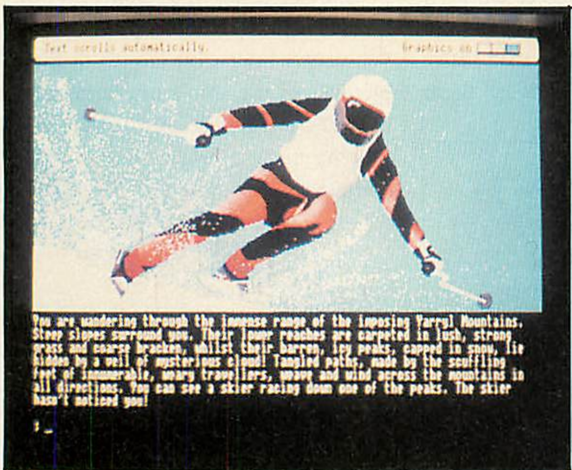
*Titanic* joins the very best historical packages like Tressel's *Wagons West* and *Into the Unknown*, Fernleaf's *Vikings* and *Normans*, and Cambridge University's *1914*. These all demonstrate the real potential that the micro has for the teaching of history. But this package seems to have even more depth and quality.

Titanic *is published for the BBC micro and Master series by ESM, Duke Street, Wisbech, Cambridgeshire PE13 2AE. The complete package costs £45.*



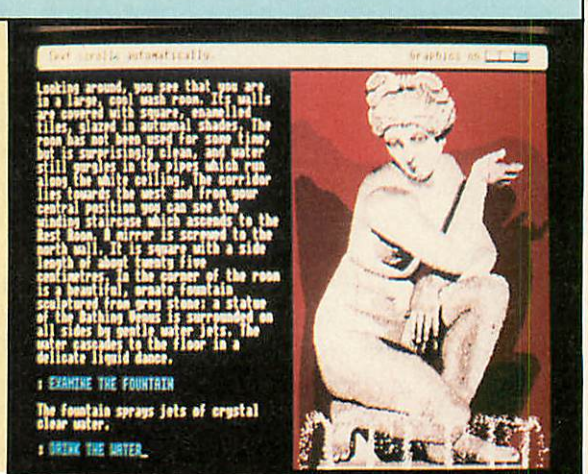
# ENTHAR SEVEN

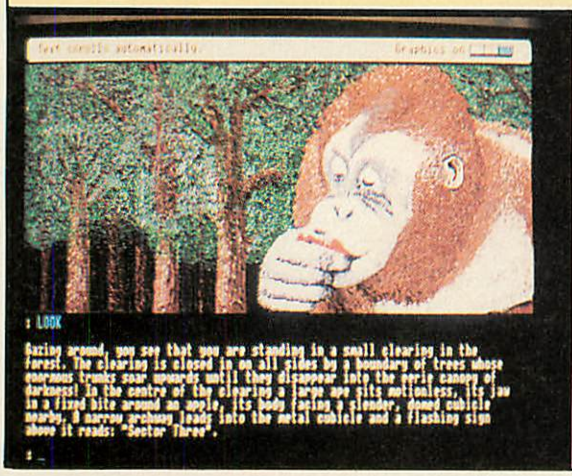
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# ACCOUNTING FOR TASTES

**Michael Leete adds up the attractions of an accounting package aimed at small businesses**

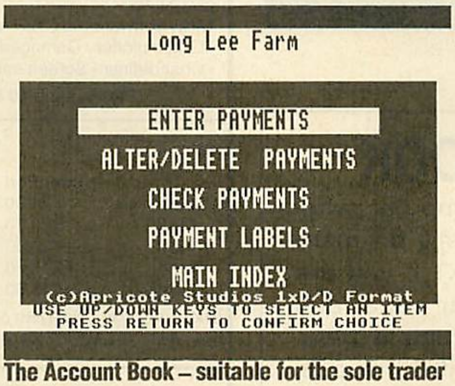
It is said that double-entry bookkeeping has been around since the Pharaohs. From before the Norman conquest, the English state bookkeeping was done with counters on a chequer board, hence Exchequer. When the Institute of Chartered Accountants was founded in 1880 (26 years earlier in Scotland), the principles of bookkeeping had already been known for hundreds of years. The first is that the bookkeeper has two chances to make the same mistake. The second, that the debit side is nearest the window.

When mechanical systems infiltrated accounting, vast Burroughs machines thundered out ledgers which preserved the appearance of the old system. The arrival of true computers suddenly presented the opportunity to simplify the procedures and soon afterwards came the home micro: an expensive games-playing machine, whose purchase was often justified as a means of domestic bookkeeping. Since then, accounting programs have proliferated.

*The Account Book*, a relative newcomer, was born from the real difficulties of keeping tabs on an actively expanding business. You need any BBC computer from model B to Master, a double-sided 80-track disc drive, a monitor and a printer. A monochrome monitor is quite satisfactory, though the menu titles may be difficult to read.

*The Account Book* is most suitable for the sole trader, working more or less from home, whose 'office' is a tiresome interruption of the real work. I have long held the view that the most effective manual system for such small family enterprises is an analysed cash book with a slip system for invoices. On the other hand, where an analysed cash book would properly record the day-to-day transactions of a business, *The Account Book* is quite adequate.

The major limitation is that there are only 13 headings for expenses and a single payment may not be allocated to more than one category. However, this shouldn't turn out to be too much of a nuisance when dealing with the accounting problems that the software is aimed at.




**The Account Book – suitable for the sole trader**

The program combines the books of prime entry into a Receipts Book, subdivided into 'received' and 'receivable', and a similar Payments Book. If the trade is a cash business, like a shop, the receipt would be the daily takings, analysed by a letter code from the till-rolls. If the business sells on credit, the receipts book consists of the sales invoices, paid and unpaid. Those that remain unpaid at any time may be listed separately. But this approach creates two problems. Partly paid invoices are not handled very effectively because they end up in both columns at once. And one of the least understood aspects of manual double-entry bookkeeping has been retained. In theory, all receipts (cash, cheques, money orders) are written into the cash column. Strictly, this is not petty cash, as described in *The Account Book* manual. When the receipts are banked, the amount, which agrees with the pay-in slip, has to be paid from cash and received into the bank column. The system has always been cumbersome and is hardly less so in *The Account Book*, since the transfer has to be made in two separate sections of the program. It is, however, a discipline that has to be learnt and, in any event, it is better than one common interpretation of the double-entry system – cheque receipts are entered in the business accounts and cash receipts are entered in the back pocket.

An excellent feature of the program is that if any entry is omitted, which is very likely in the case of bankings, the trial balance reports the omission, and it may be added at any time, since the computer automatically sorts all entries into date order. This is also effective for standing orders, which may be recorded at one sitting to appear later in their proper sequence. Most important, there is no preordained limit set on the number of transactions for any period.

The least useful utility is described as Profit/Loss Graph. The program cannot handle stock-in-trade, uninvoiced accruals and depreciation. Consequently, it cannot calculate profit in the true sense.

The program incorporates a number of useful shortcuts. For example, the date of a transaction has to be entered in full – December 7 being 071288. If the next transaction happened on the 10th, typing 10 would copy the rest of the date. VAT is calculated automatically on any sum you type in – making it easy to check VAT amounts on invoices and so on. A less useful shortcut concerns amounts. Most keyboard users are accustomed to typing £9.80 as '9.8', leaving the computer to insert the trailing zero. Here, all trailing zeros have to be entered, so 980 becomes £9.80 and 98 becomes 98 pence.

Probably the most useful part of any accounting program for a small business is a hassle-free VAT calculation. The VAT rate can be changed, the period may be defined by the user and a full list of items with their related VAT printed for those periods. The accuracy of the hard copy clearly depends on the accuracy of the prime entries but by stapling the print-out to each copy of your return, the figures may be reconstructed for the VAT inspector if necessary.

It is possible to imagine some improvements that could be made to *The Account Book*, but in my opinion the program is well thought out, well presented and, at £27.95, sensibly priced.

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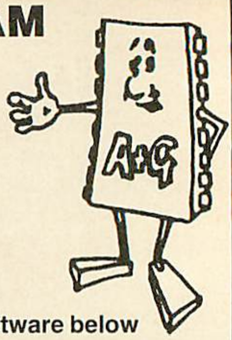
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letters of thanks and the following quote is typical, for which we thank Mr G Allcock of Southampton. "Without doubt the solution to my book-keeping problems. It is incredible value for money and its operation is simplicity itself". It costs just £27.95 (including free telephone helpline) and is suitable for the BBC B upwards. If you would like to order a copy or want a fact sheet please telephone us or use the coupon below. The Account Book is available on disc and requires a mono or colour monitor and dot matrix printer. Latest version includes enhanced vat return.
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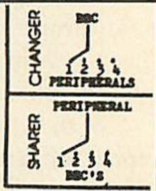
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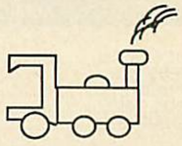
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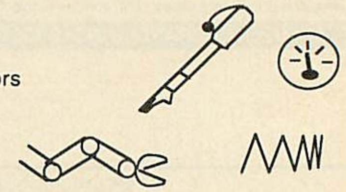
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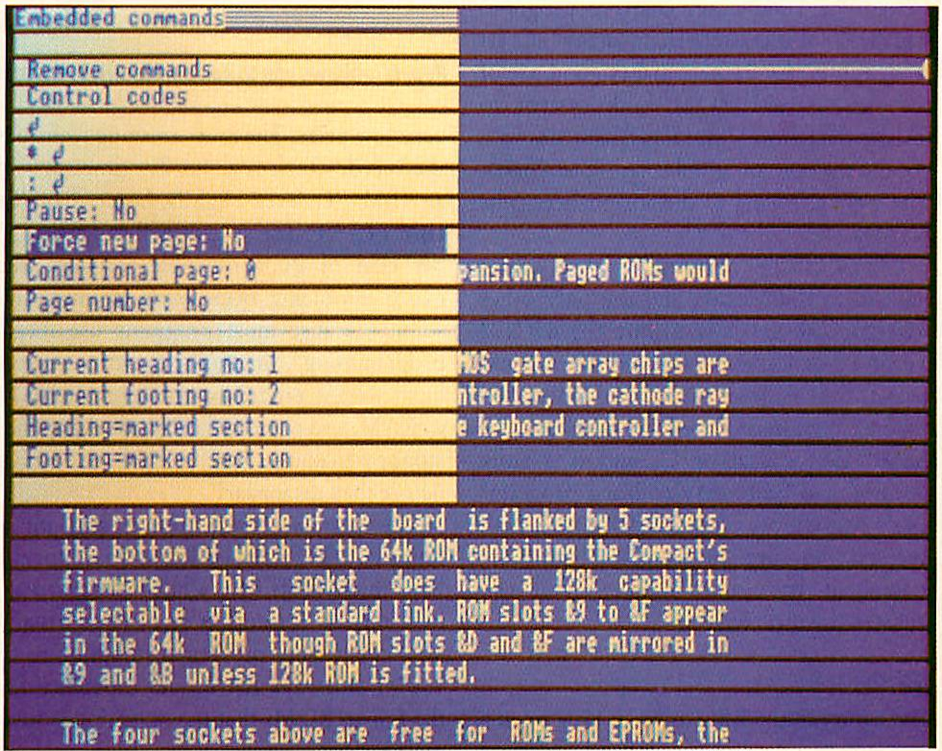
**What's the best product you've ever bought for your micro? See if it figures in what we think are the best 100 products for the BBC micro**

What are the best 100 products for the BBC micro? That's the question *Acorn User* asked a panel of its regular writers. And this is what they came up with. The items cover both hardware and software, past and present, and the surprise is that there was a good measure of agreement about the list. From over 200 products suggested initially, a list of around 150 emerged as contenders that everyone agreed on, and these were narrowed down to the final 100 after much discussion.

Almost everyone uses their micro for wordprocessing, and there are a large number of different wordprocessing packages for the Beeb. But many of these are aimed at specialists – script writers or scientists for example. Relatively few packages have attained popularity in the mass-market. Among them is the first BBC wordprocessor. Computer Concepts' *Wordwise* was more or less the first application ROM, and many people still think it is the most useful piece of software ever produced for the BBC micro. With reputed sales well into six figures, it may also be the best seller. Now it has been superceded by *Wordwise Plus*, which also contains a programming language to use for repetitive operations.

*View,* the flagship Acornsoft product, also has a great following, and is invaluable for 80-column work. Like *Wordwise,* a support industry has grown up around *View,* which further entrenches its dominant position.

Computer Concepts has another strong competitor to *Wordwise* in *InterWord.* It is the wordprocessor part of the *Inter*-Series, with an up-to-date 'Look' incorporating pull-down menus and on-screen highlight effects. It has a 53 and 106-column screen mode, and is regarded by many as the ultimate in BBC wordprocessing. It works best with Shadow RAM, and makes a good companion for *SpellMaster,* also from Computer Concepts. This is an amazing 128k of ROM, with a huge compressed dictionary. It is a superlative spellchecker for most of the major wordprocessors. The checking is interactive as you type.




***Wordwise* – perhaps the most useful piece of software produced for the BBC micro**

The best disc-based spelling checker, intended for use with *View,* is *ViewSpell.* But it can only check text files – it can't check your spelling as you type.

*Instant Mini Office 11* is the ROM-based top-of-the-range version of *Mini Office*, which contains a surprisingly good set of integrated software for a rather low price – £60. The wordprocessor and comms modules are particularly good, and the disc version is only £19.95.

Acorn's *ViewStore* is a fairly flexible database manager, and when used with a hard disc can be quite fast too. But it is a little complicated to set up a database from scratch. The utilities supplied make it easy to print labels, standard letters and write reports based on the records contained in the database. If *ViewStore* is too complex, then the simpler *Masterfile* from Beebug should suit. It gives basic but flexible facilities for address book-type files.

Spreadsheets are less popular than wordprocessors or databases, but there are three particularly good examples for the Beeb. Of these, *UltraCalc 2* is the cheapest at £29.95 from BBC Soft. This excellent spreadsheet, now selling at almost a quarter of its original price, was written by the company which wrote the BBC operating system for Acorn, and pre-dates the machine itself. Version 2 was the first ROM to go 'auto-hi' on a 6502 second processor, now a common feature. The command interface is similar to *Supercalc* and *Lotus 123,* making it easy for experienced spreadsheet users to transfer. BBC Soft does a utility support disc for £5 too.

The *View* family spreadsheet, *ViewSheet,* takes a little time to master, but is very powerful, with its multiple screen and printer windows, and a large range of functions. Spreadsheets can be linked together using link files on disc. Adequate graphing support comes from the companion program *ViewPlot,* or, indeed, from

*Acorn User*'s own alternative, *ViewChart*.

The third spreadsheet selection is *InterSheet,* which costs £50 from Computer Concepts. A component of the *Inter* family, this is not only a fast spreadsheet, with useful features such as the 106-column mode, but also, the linking system is put into good effect to transfer data to *InterChart,* the companion charting program, which is also faster than many of its competitors. *InterChart* makes good use of the *Inter* series' ROM Link system to import data from *InterSheet,* and draws a good selection of graphs and pie charts. The ease of linking to the spreadsheet is its best feature.

*Edit 4* is the next editor that comes built-in to the Master, and the only other way you can get it is to buy the 65C102 Turbo co-processor – a Hi version for use across the Tube is supplied. It's a developed version of the editor supplied with Acorn ISO Pascal or C, and is a fully featured and quite easy-to-learn programmer's text editor. On a Master 128, it isn't necessary to save the program before reloading it back into Basic – you can transfer them directly.

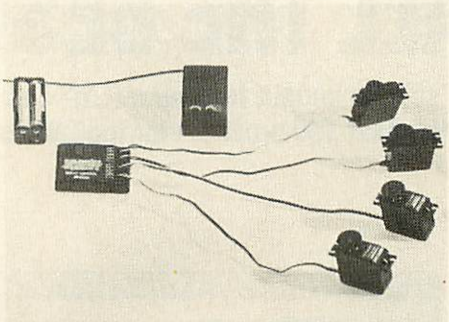
## Hardware

The nature of the BBC micro is very open – it accepts standard peripherals like printers, and it is fairly easy for companies to design add-on hardware to increase the capabilities of your machine. Typical of products like this is Watford's Aries B32 Shadow RAM board. It gives you 20k of shadow RAM for £92, and allows you to use very long Basic programs even in Mode 0 on a BBC B. Just as on a Master, HIMEM stays at & 8000 in all modes. It's fairly simple to plug in and can even be used as a 12k printer buffer.

The HCR 32k Sideways RAM was the first unit to offer 32k, or two banks, of sideways RAM storage, but most people load it with ROM images they don't use often, to save them having to plug ROM chips in repeatedly.

Commotion's *Beasty* is an interface unit that attaches to the micro's user port and allows you to control all manner of electrical devices, in particular a set of servo motors. These tiny motors are ideal for constructing control systems for mechanical devices, robots, models and so on.

The Acorn Master 512 board gives you an awful lot of IBM PC compatibility, for a very low price. The most amazing feature is the speed, which is about five times that of an IBM PC, even slightly faster than the IBM PC-AT. The system will run about 80 per cent of PC-compatible software, the major problems being with comms and sound because most programs use illegal programming methods, with newer heavyweight programs which require 640k of RAM, and protected software. Acorn has stopped making them, so grab one quick before they disappear!

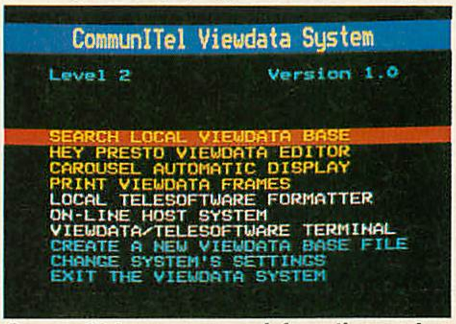


***Beasty* – allows you to control electrical devices**

The popular, tried, tested and ultra-reliable ATPL Sidewise ROM board for the BBC micro costs £40. While not particularly strong on features, it gives you virtually no compatibility problems, an option to fit 16k of Sideways RAM, and capability for the full 16 ROMs that the operating system will support.

Unlike some of its more 'experimental' ideas, the £30 Solidisk TwoMeg 128 board is robust and reliable, and offers two 32k ROM sockets plus a massive 128k of Sideways RAM. These can either be used as eight banks for ROM images, or four normal banks plus a Shadow RAM system. The latter is a software feature, which is most popular for use with *InterWord*, which, like all 80-column wordprocessors, must have Shadow memory to give a decent amount of workspace.

PMS' *Genie* is a £79.35 add-on board that gives you a pop-up calendar, notepad, database and other utilities. Being hardware-based, it will pop-up from, and return to, just about anything. Extremely useful, and there's nothing quite like it. A software-only version, *Genie Junior*, is available for £25.




***CommunITel* – run your own information service**

*Replay*, which costs £29.90 from Vine Micros is the standard item for transferring cassette tape software to disc. A combination of software and hardware, it will freeze virtually any program, and then save it to disc. No technical knowledge is needed to make the transfer.

There are both 8271 and 1770 versions of the Watford DFS, which, unlike some third-party disc filing systems, is extremely compatible with the official Acorn version. They cost £55 and £45 respectively. The extra features are sensible and useful, and it is the only non-Acorn DFS which contains Tube support code – so you don't need to keep your Acorn DFS ROM in to run a second processor.

Teac double sided 40/80-track switchable disc drives are available from several manufacturers. The switch allows you to read 40 or 80-track discs without any tricky software. This solves all sorts of problems, particularly with games whose protection prevents software double-stepping on your disc drive.

The Concept Keyboard from Star Micro Devices is a touchpad keyboard that's widely used in education, particularly with younger children and disabled students. It allows software to read presses of a large pad, which can be fitted with a pictorial overlay. A large elephant picture might mean 'remember' or save, for example.

The Music 5000 Synthesiser from Hybrid Technology is an add-on electronic synthesiser that's controlled by the BBC micro. It can be programmed in a language called Ample, or music can be written with a variety of more normal musical tools – a musical stave-based editor and an on-screen 'mixing desk' for example.

The AMX Mark 3 mouse is the 'standard' mouse for the BBC micro, and a very similar unit is supplied with Acorn's Archimedes. It is neat, reliable, and comes with AMX *Stop Press* or *SuperArt.* It is universally supported by mouse controlled software for the Beeb.

An excellent alternative to a mouse when desk space is tight is the RB2 Trackerball, which costs £59 from MEDL. Many soft-

ware packages offer RB2 support as an alternative to a mouse, but a trackerball-to-mouse adapter, which makes the computer think the RB2 is an AMX-style mouse, is available from most dealers.

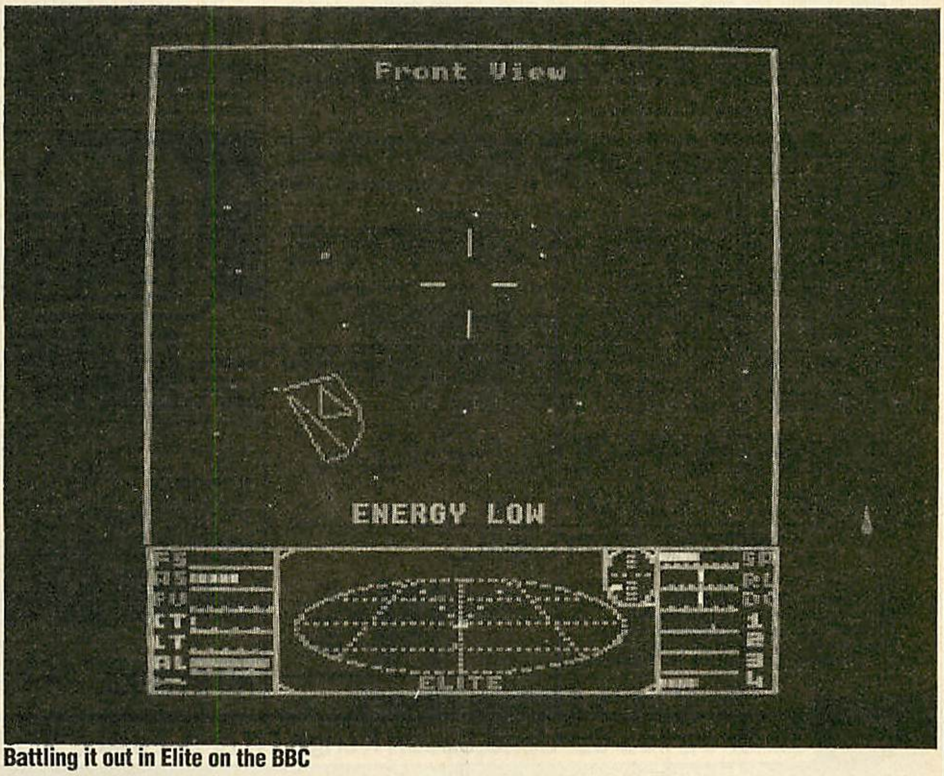
*Zenith's* ZVM 1200 monitor is a good budget choice for a monochrome monitor. It's small and neat, easy to connect up, and performs at least as well as other mono monitors. Among colour monitors, the Philips CM 8833 is a good value medium resolution model, and is very similar to the one supplied by Acorn. The advantage is that you can also connect up composite video sources like a TV turner, in addition to the usual SKART or RGB imputs from your computer or video cassette player.

The design of the BBC micro makes it compatible with almost every printer – from the cheapest dot-matrix model to very expensive laser printers. But one thing which is almost indispensible for any sort of printer is a Viglen perspex printer stand. They cost about £20, and allow you to store your paper underneath the printer itself.

The Juki 6100 is seen as the 'standard' daisywheel printer for the BBC micro. It is a little slow, but quite robust and offers extremely good value for money at about £340. The quality of daisywheel print is very good – the only problem is the lack of a graphics capability. Dot-matrix printers solve this – among them, the Kaga 810 or 815 (also known as the Canon PW1080 or A50) is probably the most common recommendation. It is fully compatible with the Epson FX80 (815 an A50 with the IBM Proprinter too), and it has a convenient tractor feed.

Epson's GQ3500 is an excellent low-cost laser printer, and a good first choice for someone upgrading from a matrix or daisywheel, although you'll have to do some programming to produce graphics. It usually includes free emulation and font cards, and sells for up to £500 off the list price – typically around £1500. The Epson LQ800 is a fairly typical 24-pin printer, but it is faster than most of the low-price competition. For £500, you get pretty good letter-quality text in a small selection of fonts. There are also some add-on font cartridges, but they are quite expensive.

The latest LC10 nine-pin Star printer, which also comes in a 24-pin version called the LC24, gives complete FX80 compatibility, a good selection of new features, such as double-height text – quite rare and much prettier than double-width – and a colour printing option. Star printer accessories such as sheet feeders are usually cheaper than the competition.



**Battling it out in Elite on the BBC**

As with printers, the BBC micro can be used with almost any RS232 modem. For example, the Amstrad SM2400 (£249) was not produced for the BBC but works perfectly with it, and offers the cheapest possible route to a BABT approved four-speed modem, with V21 (300 baud), V22 and 22bis (1200 and 2400 baud), and V23 (Prestel standard) operation. It is also Hayes-compatible, with auto-dial and auto-answer, and so can be used with almost any comms software.

## Budget range

In the lower price range, £129 (or sometimes up to £20 cheaper) can get you a Pace Linnet. It's a Hayes-compatible modem, with full auto-dial and auto-answer, but only gives you the both V21 and V23 communication speeds. If you have a Master 128, the hole to the left of the circuit board is intended for an internal modem. The Beebug Internal Modem, at £119, is the only one which fits this slot. It's BABT approved, and works at V21 and V23 speeds.

Every BBC micro owner collects utility software. With a wordprocessor you might want a printer utility to improve the fonts you can print. With a teletext system, you need a teletext editor – a flexible viewdata editor such as Morley's *Design 7* allows you to put together mode 7 screens very easily. And sometimes you can use utilities to add facilities to the operating system of your machine. This is the case with the Beebug Master ROM – which adds nearly 50 extra star commands like *AFORM and *DIRCOPY, a control panel and a RAM disc to your Master 128.

With the PMS NLQ font ROM, you can make your printer turn out very high-quality text for £34. There are seven fonts supplied in the twin ROM set, you can use them in different sizes, with justification if necessary, and add-on discs of a dozen extra fonts are available for £15.

The standard disc toolkit that works with both DFS and ADFS is *ADT* from Pres. It allows you to copy discs and repair faulty ones, as well as inspect individual sectors.

Acorn's Basic Editor ROM is an indispensable aid for Basic programmers. In effect, it allows you to wordprocess your programs, taking advantage of all the usual editing functions of a wordprocessor, like block moves and search and replace. It is easy to swap between Basic and the Basic Editor, and furthermore you don't need to

# PINEAPPLE SOFTWARE

**Programs for the BBC model 'B', B+, Master and Master Compact with disc drive**

## DIAGRAM II
– now also available for ARCHIMEDES

Diagram II is a completely new version of Pineapples popular 'Diagram' drawing software. The new version has a whole host of additional features which make it into the most powerful and yet quick to use drawing program available for the BBC micro. The new features mean that 'Diagram II' can now be used for all types of drawings, not just circuit diagrams. Scale drawings are possible and the facilities for producing circles and rubber banded lines together with the pixel drawing routines make any type of drawing possible. This advert has been produced completely using Diagram II.

**Summary of Diagram II features:-**

1. Works on all model BBC computers and makes use of Shadow memory if poss.
2. Rapid line drawing routines with automatic joins for circuit diagrams.
3. Rubber band line and circle drawing modes.
4. Makes use of the Acorn GXR rom to produce ellipses, arcs, sectors, chords and flood filling.
5. Pixel drawing mode allows very fine detail to be added.
6. Defined areas of screen may be moved, copied, deleted or saved to disc.
7. On-screen cursor position indication allows scale drawings to be made.
8. Keyboard keys may be defined to print User Defined Characters allowing new character sets to be used.
9. Wordprocesser files may be loaded and formatted into defined areas.
10. Up to 800 UDC's if shadow memory available, 381 without shadow.
11. Compatible with Marconi Trackerball and most makes of 'mouse'.
12. All 'Diagram Utilities' are included.
13. Completely 'scaleable print routines allow any area of the diagram to be printed either horizontally or through 90deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
14. Smooth scrolling over the whole area of the diagram.

**Diagram II consists of a set of disc files and a 16k Eprom. The disc is formatted 40T side0 and 80T side2. Please state if this is unsuitable for your system, or if you require a 3.5" Compact disc**

**DIAGRAM II – £55.00 + vat** P & P free

## MARCONI TRACKERBALL

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| For Model 'B' and B+ (with Icon Artmaster) | £ 60.00 | + vat |
| For Master 128 (with Pointer Rom) | £ 60.00 | + vat |
| Bare Trackerball (no software) | £ 49.00 | + vat |
| Pointer Rom (available separately) | £ 12.50 | + vat |
| Trackerball to mouse adapters | £ 8.00 | + vat |
| Postage and Packing on Trackerballs | £ 1.75 | |

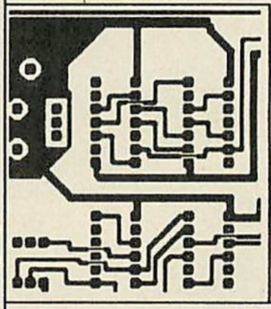
## PCB

Pineapple's now famous PCB drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and uses a mode 1 screen to display the two sides of the board in red and blue either separately or superimposed. Component layout screens are also produced for a silk screen mask.

The print routines allow a separate printout of each side of the board in an expanded definition high contrast 1:1 or 2:1 scale. The print time is typically about 5 mins. for a 1:1 print of a 7" * 5" board. This program has too many superb features to adequately describe here, so please write or 'phone for more details and sample printouts.

**£85.00** + vat — Plotter driver to suit most plotters £ 35.00 +vat



## PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest! You may specify which side of the board you wish a track to be on or you may leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins.

The program is in the form of a second Eprom and full features are available on a standard model 'B.'

Please write or 'phone for full details.

**COMPLETE AUTOROUTE PACKAGE (Including manual Eprom) £185.00 + VAT**

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save your program in between.

An excellent utility for the BBC and Master which has a full set of BASIC programmers utilities (find text, replace, pack, single statement list, smart renumber and so on), and some other general utilities is Clares' *BROM+*. Unlike many ROMs, it is written for usefulness, rather than cleverness or ease of coding, and it costs £34. A Sideways RAM version is available too.

For machine code programmers, BBC Soft's ISMEC monitor is a good machine code monitor that allows you to inspect and debug your 6502 code. It allows all the usual single stepping, disassembly and break points in a neat package.

For comms enthusiasts, Modem Master from BBC Soft is a disc-based Viewdata/ASCII terminal and is one of the few to offer auto-dialling directories, and installable modem drivers. A Hayes driver is included. The manual is excellent, as is the price – at £12.95 it's also about one third the price of the competition. If you want to run your own information service, then *CommunITel*, at around £200ish, is a full-featured Viewdata host system which runs on disc, ADFS or network. The documentation is superb, and the whole package is very easy to use. It is normally sold with a suitable auto-answer modem.

Superior had a slight excursion outside the games market with *Speech!*, an ingenious software-only speech synthesiser. It gives nearly as good reproduction as the Acorn speech hardware, and lets you devise any phrase, not just preprogrammed ones. Direct phoneme programming is also available, and there is a sideways RAM version of the program on disc too.

The Island Logic Music System from System Applied Technology is the fullest package for making music on the built-in speaker of the BBC micro. It allows you to write scores on a musical stave, edit sound envelopes, and play back your tunes.

Vital for any serious graphics work on the model B is the Acorn graphics extension ROM, *GXR*. There's a separate version for the B+, and both cost around £25. They add most of the new graphics commands that the Master and Compact have, including circle, ellipse and sprite PLOT commands.

*Snatch* from 4Mation seems to be the best screen-saving software, almost indispensable for printing out screens from commercial software. It even works with some protected software, and there's a pixel editor and screen-dump built in. *Ice Box* from Event One was similar to *Snatch*, in that it could be used to grab screen images from commercial software. But it could also transfer most cassette software to disc.




***Wagons West*: a host of teaching resources**

AMX *Art* and *SuperArt* from AMS are excellent general-purpose painting programs, for which a mouse is essential. They were the first ones to make a Beeb look like an Apple Mac, and *SuperArt* costs about £68 including the mouse. AMS' *Stop Press* has to be the most widely used desktop publishing package for the BBC micro. It can't produce the sort of results that you get from an Apple Macintosh, but with care you can create very impressive pages.

Watford's *Quest Paint* screen painting package is probably a little ahead of AMX *SuperArt* now, with more flexible drawing tools. In particular, the *Conquest* utility ROM can be added to give you a number of extra drawing effects and a text font editor. *Quest Paint* costs £62 with a mouse, or £37 without: *Conquest* is £33.

Alan Burns' first graphics drawing program, *AB Design*, was easy to use, and ideal for architectural pictures where perspective effects are important.

Almost everyone has an occasional need to produce signs and banners. *SignWriter* from Wight Scientific is a unique program that can generate any size of lettering on a matrix printer in a variety of fonts. There's also a clever and useful utility for owners of personal organisers; *FaxFile* from Mewsoft. It allows printing of form pages, and data in a form for clipping into the ubiquitous status symbol. *Signwriter* costs £29.95.

The original Acorn teletext adapter, which suffered greatly from being difficult to use, can be upgraded with the *Advanced Teletext System* ROM from BBC Soft. The ROM costs £9.95 from BBC Soft. Morley and GIS have produced their own more up-to-date adapters, which both come with versions of this ROM. *ATS* makes teletext, and particularly telesoftware downloading, very much simpler.

## Games

If there's one thing that unites all micro owners, it is games. There is a huge variety of good ones, and the selection presented here aren't all still available. But they do represent the best, and each would be a worthwhile addition to your collection.

Ask anyone for a list of the most popular games on the Beeb, and the chances are they will pick one of the versions of *Repton*. Version 3 finds most favour, and another game similar in concept is *Bonecruncher*, also from Superior. Arcade adventures are represented by Micro Power's *Castle Quest*, and *Starquake* from Bubble Bus.

Almost everyone would also pick *Elite* from Acornsoft (now supplied by Superior) – with the Tube version on the Master *Elite* disc running faster and with more colours. A special vote for *Exile*, Superior's latest, also secures it a place in this selection.

The best-loved platform and ladder games for the Beeb are probably *Chuckie Egg* from A&F Software, and Addictive Software's *Boffin*. While the graphics of the former were crude to say the least, the latter looked superb. *Fortress* from Amcom is the only successful version of the coin-op arcade game *Zaxxon* for the Beeb.

*Revs* and *Aviator* from Superior/Acornsoft are the best liked and most accurate motor-racing and flight simulators for the BBC micro. Both are simulations, rather than out-and-out games, of driving a Formula 3 car or a Spitfire respectively.

Shoot 'em ups based in space form the core of any group of games, and *Starship Command* from Superior/Acornsoft, Electric Dreams' *Firetrack* and Aardvark's *Zalaga* are among the best. Interestingly, the latter two are both written by Orlando, also author of *Frak*. Though this too is a good platform and ladder game, Aardvark's Electron version is more popular, and considered better than the BBC version because it has a screen designer included.

There are a few games which require both serious thinking and quick fingers. Two

that fit this bill well are Mirrorsoft's *Tetris* and *Thrust* from Superior. The former has you fitting blocks into a grid at high speed, the latter demands an understanding of gravity and momentum to play well. For the more cerebral, BBC Soft's *White Knight II* was for a long time the strongest chess program, although it has now been superceded. And *Colossal Adventure* from the ever-reliable Level 9 is the best version of Crowther and Wood's original adventure game for the BBC micro. Among other adventures, the disc-only *Acheton* is probably the largest.

## Education

A large number of BBC micros are used in education, attracting some of the best educational software in the world. The available selection is vast, and covers the age range from pre-school to university level.

Two products worthy of mention here are *Ecodisc,* a BBC Enterprises interactive video disc for use on the Advanced Interactive Video hardware – the Domesday system – and SJ Research's MDFS Econet fileserver. It is recognised as offering many features unavailable in Acorn's own network fileserver.

As with business and the home, the major uses for computers in schools include wordprocessing and database management. The *Key* database manager from ITV offers unparalleled value for money. Among wordprocessors written specifically for school students, *Pendown* from Logotron and *Folio* from Tedimen Software stand out. The latter is available in a series of variants offering wordprocessing in regional and ethnic minority languages.

Free software is an important feature of the education scene, particularly at primary level, and the old but still well-liked *Developing Tray* program is the epitome of this. And some of the best school software has been around for several years: ESM's *Podd* and *Granny's Garden* from 4Mation fall into this category.

Simulations abound, each offering some kind of surrogate experience to the child. An outstanding example is *Wagons West* from Tressel Software, which involves human migration across America in the middle of the last century. As well as the software, it provides a host of other teaching resources, as does *World without Words* from 4Mation. This offers problem-solving and exploration of the theme of 'communication' through media other than words.

Logotron Logo is the standard implementation of Logo on the BBC micro. It is supplied as standard with the Master Compact, and there's a set of extension discs like Control Logo and Music Logo to make specialist programming simpler. The ideal complement to Logo is the Jessop turtle – the original 'Edinburgh' model and everyone's idea of a Logo turtle. The hemispherical perspex hood is clear, so you can see the motors and wheels revolve.

*Moving Molecules* from Cambridge Micro Software is a well-respected secondary level chemistry teaching aid. But the sciences are not the only subjects that benefit from the Beeb; *Typesetter* is Sherston's successful desktop publishing package aimed at schools, and is ideal for encouraging creative writing. *French on the Run* from Database Software is a great way to improve your French, as it simulates practical use of language. For business studies, *Micros in Business* from Acorn offers a cut-down version of the *View* family to present the practical use of IT in business. And GSN's *Mail Order* is a simulation of a mail order operation that allows pupils to practise at business in the classroom.

CDT has *Craft Design and Technology* from BBC Soft, and the Deltronics *Buffer Box.* Used with the *Control-IT* software from Resource, you can learn or teach the principles of control programming.

Finally, in the field of admin, Alan Dean Software produces the *School Administration System,* aimed at making life easier for heads and year heads who have to manage class lists, timetabling and exam entries.

That completes this personal selection of the best software and hardware for the BBC micro. Of course the list is personal – it reflects the experience, knowledge and prejudices of those who compiled it – and you may have many favourites that didn't make it into this top 100. If you have any suggestions, disagreements or criticisms, then please write in and let us know.

### FURTHER INFORMATION

**4Mation,** Linden Lea, Rock Park, Barnstaple, Devon. **Aardvark,** 100 Ardleigh Green Road, Hornchurch, Essex. **AB Designs,** 81 Sutton Common Road, Sutton, Surrey. **Acorn Computers,** Fulbourn Road, Cherry Hinton, Cambridge. **Addictive Software,** 10 Albert Road, Bournemouth. **Alan Dean Software,** 37 Bridle Road, Burton Joyce, Nottingham. **AMS,** Wilderspool Causeway, Warrington, Cheshire. **Amstrad Consumer Electronics PLC,** Brentwood, Essex. **ATPL,** Station Road, Clowne, Chesterfield, Derbyshire. **BBC Soft,** Woodlands, 80 Wood Lane, London W12. **Beebug,** Dolphin Place, Holywell Hill, St Albans, Herts. **Cambridge Micro Software,** Edinburgh Building, Shaftesbury Road, Cambridge. **Clares Micro Supplies,** 98 Middlewich Road, Northwich, Cheshire. **Commotion,** 241 Green Street, Middx. **CommunITel,** 189 Freston Road, London W11. **Computer Concepts,** Gaddesden Place, Hemel Hempstead, Herts. **Database Software,** Europa House, Adlington Park, Macclesfield, Cheshire. **Electric Dreams,** 31 Carlton Crescent, Southampton, Hants. **ESM,** Duke Street, Wisbech, Cambs. **GSN,** 50 Stamford Street, Ashton-Under-Lyne, Lancs. **HCR,** HCR House, Barkers Lane, Ingatestone, Essex. **Hybrid Technology,** Robert Davies Court, Nuffield Road, Cambridge. **ITV Publications,** 6 Paul Street, London EC2. **Jessop Microelectronics,** Unit 5, 7 Long Street, London E2. **Level 9,** 5 Mendip Road, Crown Wood, Bracknell, Berks. **Logotron,** Dales Brewery, Gwydir Street, Cambridge. **MEDL,** Carholme Road, Lincoln. **MEWsoft,** 11 Cressy Road, London NW3. **Micro Power,** Northwood House, North Street, Leeds, W Yorks. **Mirrorsoft,** Athene House, 66-73 Shoe Lane, London EC4. **Morley,** Morley House, West Chirton, North Shields, Tyne & Wear. **Pace,** Juniper View, Allerton Road, Bradford. **PMS,** 38 Mount Cameron Drive, East Kilbride, Scotland. **Pres,** 6 Ava House, Chobham, Surrey. **Sherston,** Swan Barton, Sherston, Malmesbury, Wilts. **SJ Research,** Intercell, 1 Coldhams Lane, Cambridge. **Solidisk Technology,** 17 Sweyne Avenue, Southend-on-Sea, Essex. **Star Micro Terminals,** Unit 6 Moorside Road, Winnall Industrial Estate, Winchester, Hants. **System Applied Technology,** Sheaf House, Sheaf Street, Sheffield, S. Yorks. **Superior Software,** Regent Hs, Skinner Lane, Leeds. **Tedimen Software,** PO Box 23, Southampton, Hants. **Tressel,** Unit 3, 22 Campbell Road, Brighton, Sussex. **Vine Micros,** Marshborough, Sandwich, Kent. **Watford Electronics,** 250 Lower High Street, Watford, Herts. **Wight Scientific,** 44 Roan Street, London SE10.

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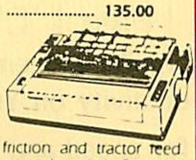
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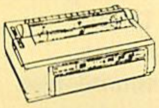


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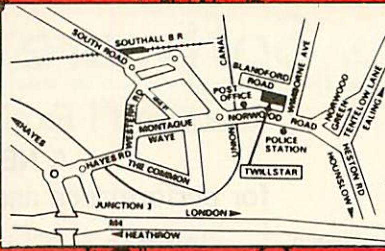
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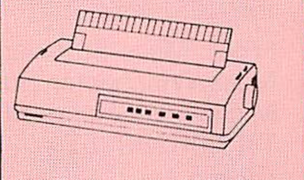
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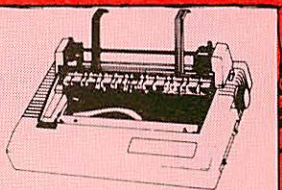
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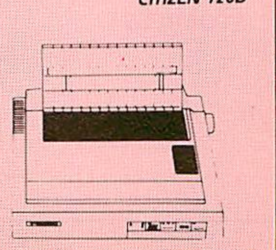
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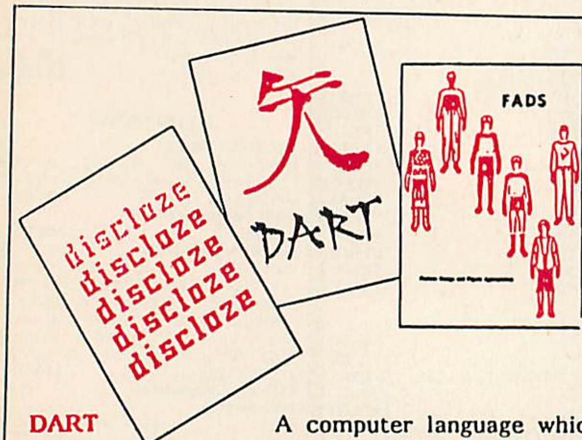
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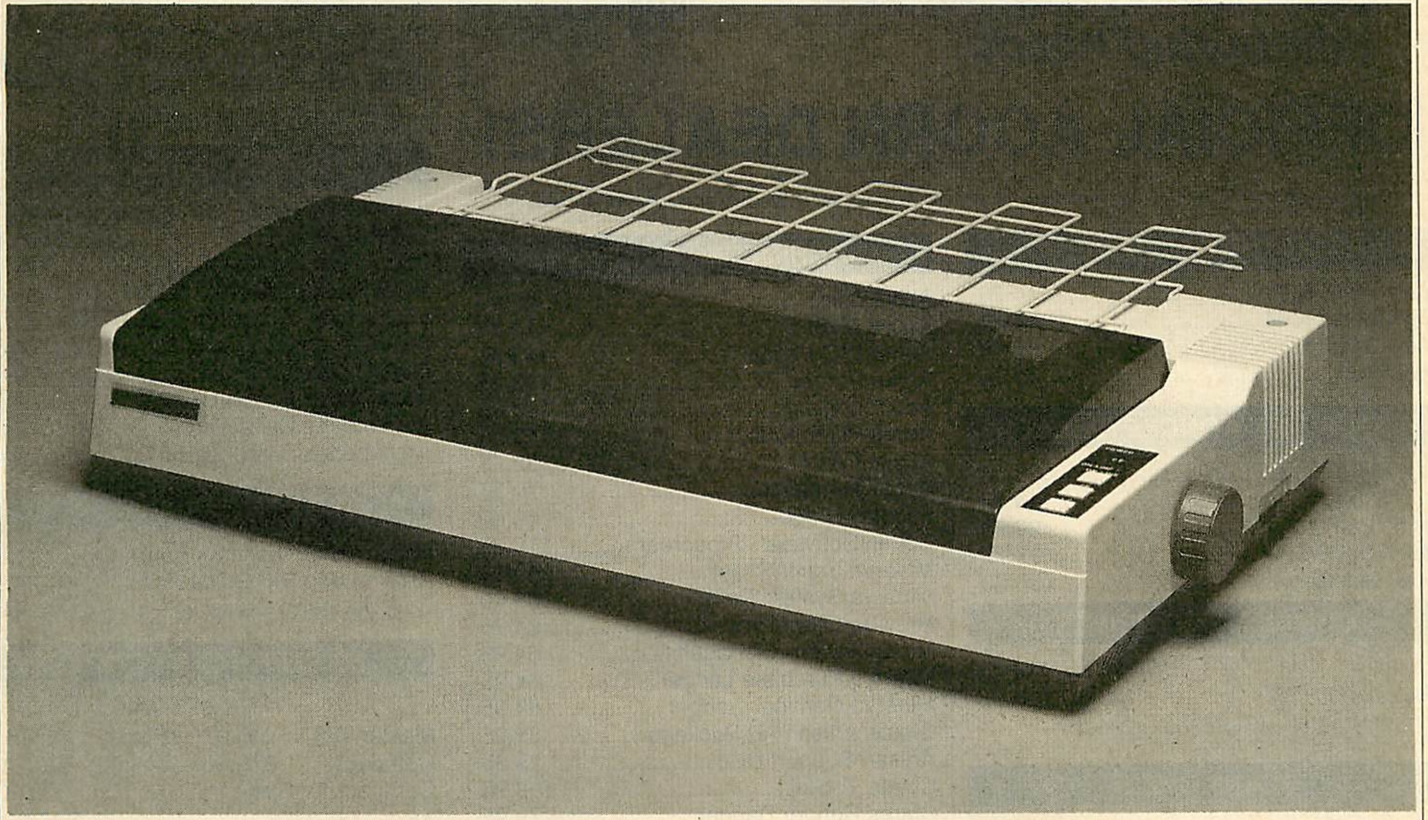
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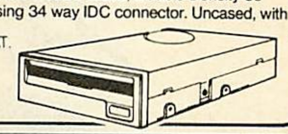
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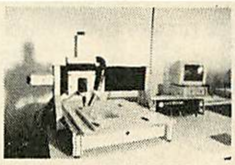
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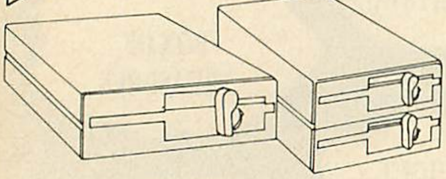
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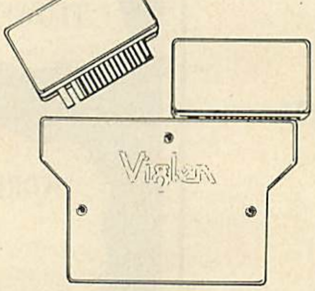


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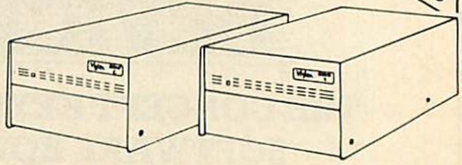

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# INTERLUDE

## FESTIVE TUNES

**More news plus a personal interpretation of a seasonal song from our very own music expert, Ian Waugh**



It's almost Christmas and I thought I'd jolly you into the Yuletide spirit with a seasonal tune for the Music 5000. Lack of space on the yellow pages means it can only be included on the monthly disc.

I've chosen a rather neglected carol called *Patapan*. The tune plays three times: the first time it plays fairly straightforwardly, though arranged in the style of Waugh. The second time there's a few frills thrown in, and the third time it has added percussion and snatches of other carols inserted between the bars. See if you can recognise them.

There's nothing particularly clever about the arrangement, but there are a few programming features you may find interesting. The 'cls' word shows how VDU calls are made in Ample. 'rhythm1' and 'rhythm2' demonstrate how rhythm patterns can easily be constructed on a grid.

Notice the volume words, 'p', 'mf' and 'ff'. It's all too easy not to use dynamics at all, but by defining loudness words like these it's simple to include volume changes. I hope you find them effective in this piece.

One of the most interesting aspects of Ample is the opportunity it affords for user-interaction. The 'menu' word demonstrates two applications. The first is simply the use of menus programmed in Ample. The menu function is built into the language and is completely automatic. Selecting an option carries out the instruction on the other side of the % sign.

I've used this feature to let you select different instruments for the lead voice. The melody is played by both parts, two and three, and the first two options select the part whose instrument you want to change. This is done with the SHARE instruction. The following options select different instruments.

You can use menus for all sorts of things, and they give you something to do while listening to your music.

Amplinex, the Ample Information Exchange, reports that its ranks continue to increase, and they even have a member in Australia who obviously knows a good music system when he sees it.



**The Hybrid Music 4000 and 5000 systems at work**

Planned for the November issue of the Amplinex disc is a sideways RAM help utility by editor Kevin Doyle. It gives a short-form explanation of Ample words. There's also a feature on using the Music 2000 MIDI interface, more music theory in practice and the usual collection of questions, answers, hints and tips.

Including the November disc, members will have had access to over one megabyte of information. Amplinex co-administrator Roy Follett is keen to point out that the success of the Amplinex disc 'magazine' is due to its members. Most submissions to the disc tend to be music pieces – and distribution of that music is what the system is designed to do – but all hints and tips are welcome too.

Membership of Amplinex (see bottom right for address) costs £5 plus a formatted disc, return postage and a label.

If you have any thoughts on the sort of material you'd like to see in this column, and you haven't written yet, do so now. Musical hints and tips are also very welcome – *Acorn User* is as usual very open to suggestions here.

### NOTES

This is the first opportunity to report on the British Music Fair. The only BBC machines to be seen were on the EMR stand – no less than three Archimedes. EMR continues to develop its Arpeggio suite of MIDI and sound software for the Arc, but as of writing, only the Soundsynth module is actually completed.

■ Acorn distributor Hugh Symmonds is strong in the music field. It is planning to bundle EMR's Soundsynth and Arc Sequencer – when it's completed – with the Archimedes, hopefully in time for Christmas. It is also in the process of enlisting a 'supergroup' to help promote the Arc's music potential although it wouldn't reveal names until contracts have been signed.

■ Acorn marketing director Ian Lawrence reports that Acorn has three software houses developing music software for the Archimedes. They will be using the new RISC OS to make truly multi-tasking and fully-integrated programs.

■ Armadillo is upgrading its product line. The latest version of its eight-bit sampler for the Archimedes will be in stereo and have MIDI ports. It should sell for £144 with an optional MIDI in, out and through interface available for an extra £40.

Its real star is an upmarket, CD-quality, 16-bit stereo sampler which is expected to cost around £1149. The software is being written in C and ARM Assembler and an important feature of the system will be multi-tasking. You'll be able to plug in a MIDI keyboard and play samples with eight-note polyphony. Armadillo is aiming to remove the ST's dominance in the computer music market – it might just do it, too.

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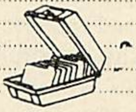
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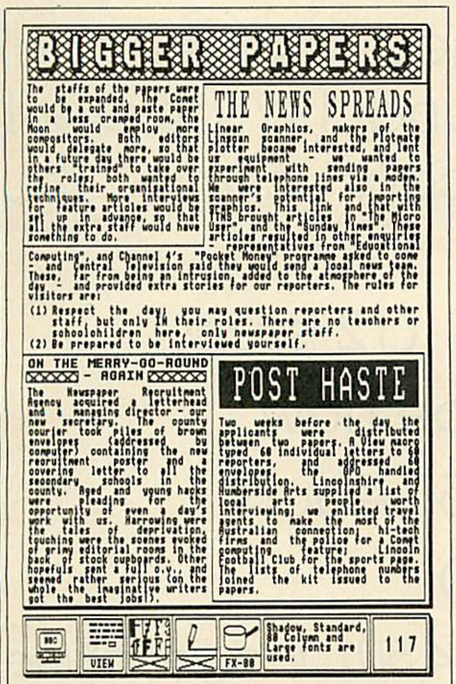
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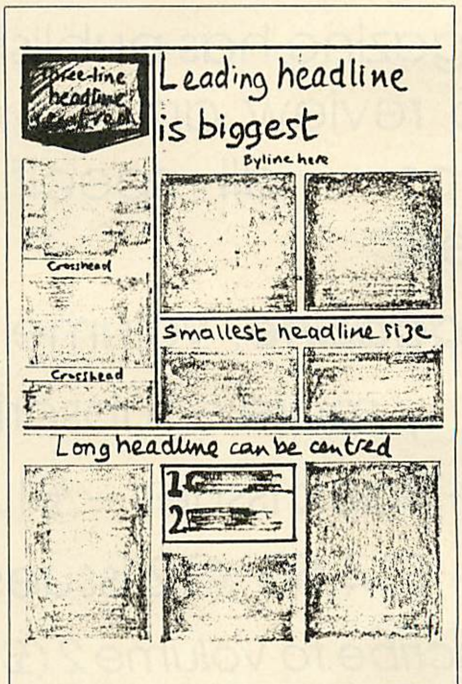
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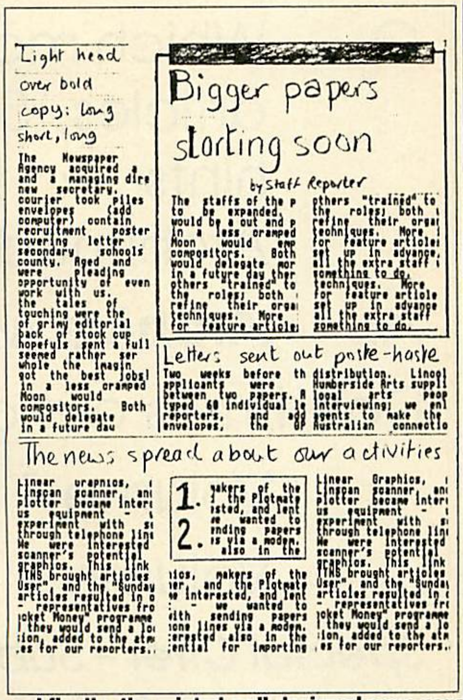
# DTP

# ALL LAID OUT

**Tony Quinn takes another look at the do's and don'ts of designing a page**




**First, a badly designed news page; second, a rough of how the page could be laid out more effectively and finally, the printed well-designed news page**

Improving the look of news pages is a bit difficult if you don't know what to look for, or what the rules are. On any professional newspaper there are ways of doing things which have built up for varying reasons, for example, limitations of the 'hot metal' technology, saving money, personal preference or just making things easy to read. When you start on desktop publishing, virtually anything is possible – stretching and squashing text, columns anywhere and an astounding choice of typefaces. So introduce the discipline of columns, allow yourself just two readable headline faces (stay away from the Gothic and italic typefaces), and let the stories speak for themselves.

Above is a page from the book *Getting Into Print* by Derek Maxted, which is a good read for any school planning a newspaper day. This page breaks many of the rules of news layout. The major faults are that 'The news spreads' story goes from one column into two, which looks very ugly; two headlines sit on top of each other; there are too many styles of headline, and the hatched boxes around them reduce their impact. In fact, the 'Post haste' story is the one your eye is drawn to first, because it has the strongest headline.

However, it's a difficult page to do in any case, because there are no pictures. Also, what appear to be the two main stories, 'Bigger papers' and 'Post haste' are the shortest.

A cleaner version of the page is shown in the middle sketch above, based on three columns to a page. This is lacking in visual interest, apart from the reversed-out headline on the left (called a WOB – white out of black). Notice the use of the shallow arrow on the WOB, a common device in the tabloids. The varying headline typefaces should be lost and just bold and light used: bold headlines over medium text stories and vice-versa. The main headline is quite big – if your software can't set that large, treat the text as graphics and blow it up there.

The final sketch shows the same page with some added typographic interest. A heavy box is used to add impact to the leading story, with a WOB across the top to lead into it. The two points made at the end of 'The news spreads' item have been boxed with the numbers added as visual interest. This box could also be tinted. Notice that the main box has its rules butting into the WOB at the top. Also note that the vertical rule goes down the centre of the gutter on the left and ranges with the edge of the page on the right. The laws governing rules can often be complex, but on the reworked pages they don't join up, except at right-angle corners. If you find something like this can't be done with your software, then cheat – get out a felt pen or the liquid paper!

The story on the left has lost its WOB – you shouldn't overdo any effect, although a small WOB title could be added to the box in the bottom story. The text is set ragged right (no right-edge justification).

Headline shapes are important. The main headline should be as full as possible stretching right across the column. If it's a bit short, the top line needs to be longer than the second. The four-line head on the left should be long, short, long, short, or long, short, short, long. In general though, fill out headlines as much as possible.

Getting into Print *by Derek Maxted; £10 from Medusa, Bishop Grosseteste College, Newport, Lincoln LN1 3DY.*

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# LETTERS

Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

## A WORD OF ADVICE

Sir, I am writing to ask advice about a wordprocessor package. I already own a BBC Master, twin double-sided 40/80 track disc drive and an old Epson printer.

I am at present undertaking a three-year degree course which will require many technical reports including diagrams, graphs, etc to be compiled. Also, spelling must of course be 100 per cent. Could you therefore suggest a suitable package (including a printer)? I have a budget of about £400 but will go over that if necessary.

Midshipman RJ Crundell, RN

**There are several choices open to you. You already have the *View* wordprocessor present in your machine, so you could use an associated program like *Viewchart* to prepare graphs. Diagrams would have to be drawn by hand.**

**The alternative would be to buy a desktop publishing package such as *Stop Press* or *Pixel Perfect*. With these you could produce all the graphs and diagrams on the computer, and include them in your text. But the quality of the printout would not be as good as using the wordprocessor system. *Spellmaster* from Computer Concepts would make an ideal spelling checker for your application. The first option would only cost about £20 for *Viewchart* and £60 for *Spellmaster*, leaving £320 for purchase of a printer. If you are looking for good quality output, then a 24-pin printer would be best. Models in this range include the Star LC24-10 and the Epson LQ-500, both reviewed in the November 1988 issue of *Acorn User*.**



**Star LC24-10: cheap 24-pin**

## PICTURE SNATCHER

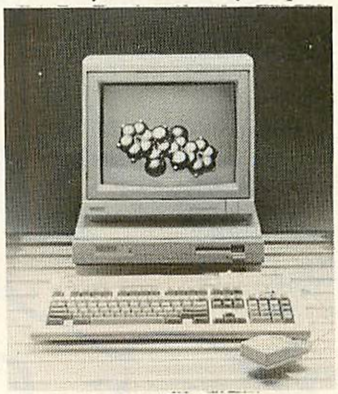
Sir, I have been trying to achieve a screen dump from software that has no facility within it. I wish to produce colour dumps on an Epson EX800 colour printer.

T E Mayell
Sidcup

**The utility *Snatch* from 4Mation should suit your purposes perfectly. It allows you to save screens from most programs, even while they are running. Screens can then be printed out using a suitable screen dump, many of which are already present on the *Snatch* utility disc. It costs £16 and requires sideways RAM. If you want the convenience of a ROM, then *Acorn User*'s *UserDump* contains a suitable dump that can be started by pressing CTRL-@. But neither of these solutions can dump screens from heavily protected software like some games.**

## VIEWING THE ALTERNATIVES

Sir, I am almost ready to buy an Archimedes 310M computer, but would like to ask a few questions before parting with my cash. First, will my existing BBC programs run under Basic 5 directly, or will they require the 6502 emulator? Some of my programs use the memory from &900 to &AFF to pass between 'chained' programs.



**Archimedes runs Basic**

Also, can I use my *View*, *Viewsheet* and *Viewstore* chips in the Archimedes?

R Moore
Herne Bay

**The majority of programs written on the BBC computer will work directly on the Archimedes, particularly if you've written them yourself. Any that don't run are usually simple to modify. The 6502 emulator is supplied as standard and will allow even programs containing 6502 assembly language to run. It will not however, work with programs that make use of the original Beeb's graphics or sound hardware – like many games – or 'illegal' programming methods. There is an upgraded emulator called 65Host being supplied with RISC OS (the new Archimedes operating system) from next April, which will allow many more hardware-dependent programs to run.**

**The *View*, *Viewsheet* and *Viewstore* ROMS cannot be used on the Archimedes. But versions of these programs can be obtained on disc and these run under the emulator.**

## DEALING OUT THE PRAISE

Sir, Dealers are a notoriously ambiguous quantity. However, I would like to sing the praises of my local dealer, Softshop, in Chalfont St Peter.

It has helped out with all kinds of problems – software, hardware, advice on purchases, even helping me track down my computer which had been returned to the mail-order company I used for repair. The company I used had gone into liquidation shortly after receiving my Master.

Softshop always has an extensive range of BBC, Electron and Arc software, and is always prepared to say if it can't get something rather than fob you off with something similar.

Finally there are staff at Softshop who are technically good. If you want to know something, someone is there who can help.

I hope you print this letter. It really deserves the praise.

Kevin Palmer
Hazelmere, Bucks

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## NETWORK NEWS

Sir, I have been asked by my Computer Studies teacher to write some utilities and multi-user adventures to run on our network. I am having difficulty in finding information concerning the network memory map and OS calls. Could you suggest a possible source of information for these?

Laurie Calverley
Reigate

**There are two books which should be of use to you: the *Advanced Network User Guide* and the *Econet Network Manager's Guide*. Both of these publications are widely available from Acorn.**

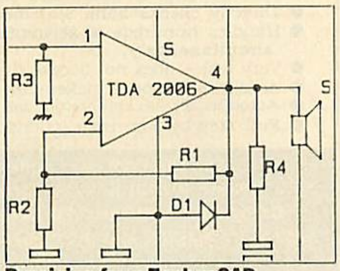
## REVIEWING TECHNOCAD

Sir, I refer to the TechnoCAD review that appeared in the November issue of *Acorn User*.

The review made reference to the smallest resolution that was obtainable. In the review, this was quoted as 0.1mm but, in fact, 0.01mm is obtainable. The resolution can be set either directly within the TechnoCAD environment or through the Toolkit. Resolution of 0.01mm (the standard resolution of most good quality plotters) has always been available within TechnoCAD.

The discrepancy occurred in Toolkit due to it being written in Basic and a bug in the Basic Interpreter causing incorrect truncating of numbers. This has now been taken care of in the program to show the smallest resoloution of 0.01mm.

I have noted your comments on the need for a variety of line types. As you are no doubt aware, the Master has a limited



**Precision from TechnoCAD**

memory capacity and we had to balance out between different utilities and the line type was the one that got dropped. However, the icon facility will take care of that shortcoming.

We had had a lot of useful feedback from some of the over 5000 NovaCAD users. Some of these ideas are implemented in TechnoCAD. Your reviewer's comments concerning the pricing are valid and in fact we had decided to revise the retail price to £99 which we believe provides good value for money.

Jay Mehta
Technomatic Ltd

## PRESTEL POSER

Sir, I've been an owner of a BBC computer plus modem for several years and had access to Prestel. Recently, I bought a modem to log on to the many bulletin boards available. The problem is, where do I begin?

I would, if possible, like to compile a complete list of boards, including name, baud rate, location and brief details of what they offer.

I Harper
Bury St Edmunds

**A list of bulletin boards was published in the July 1988 issue of *Acorn User*. Some of them use Prestel standards, and you could access these with your existing software and your old modem. To access the others, you need software that will allow you to use the V21 (300 baud) standard. BBC soft's *Modem Master* allows you to use both Prestel and V21, and costs only £12.95.**

## GETTING IT ACROSS

Sir, I have got a lead to connect two BBC micros (model B) together via the RS423 and have tried unsuccessfully to send data across it. Do you know of any software that can do this?

Richard Tinker
Calver, Derbyshire

***Modem Master* and other comms software is useful for transferring files between micros. But it is simple to write your own software to do this. For most needs, the sending micro needs to send a number to the serial port instead of a printer, and the other micro reads from the serial port instead of a keyboard. In your program, you can use *FX 3,5 to send any output to the serial port as well as the screen. You can use PRINT to send the data. At the other end, *FX 2, 1 makes INPUT read from the serial port instead of the keyboard. You shouldn't have to worry about baud rates and so on because both micros default to the same sensible values.**

## TREADING THE BOARDS

Sir, When the Master 512 board first came out, you had at least one article which covered MS-DOS compatibility. Acorn also issued a list of software which would run, but there seems to be a measure of doubt about the whole subject. Since the recent drop in price will encourage more people to buy the 512, now is surely a good time for a thorough check on the software available.

I am one of those with a Master 128, but unable to afford an Archimedes with its PC emulator. I would like to get a 512 to run standard office applications without leaving the Acorn fold.

MJ Skaife d'Ingerthorpe
London

Sir, Thank you for your article on the 512 board in the September 1988 *Acorn User* — I had given up hope of any support. I am intrigued to know that there is an upgraded version of the DOS Plus discs. But where on earth can they be obtained? I have tried in vain in Cambridge, London, Leeds, Glasgow and Aberdeen.

As for compatibility, I find the public domain word-processing program *Galaxy* will not work, because Acorn has not implemented an F10 function key. *PC File* won't work either, but *Dream* and *PC-Basic* from the same firm, Cambridge PD Software, appear to.

My big success is with L and P Forth 83 from Prospec Computer Systems, which runs amazingly fast. Portability to and from the BBC micro with Forth 83 is 99 per cent plus. What a thrill to see BBC micro programs running under DOS.

Alistair Campbell
Ellon, Aberdeen

**September's *Acorn User* contained a table of compatible software, and hints on whether other software would or would not run. The later DOS Plus 2.1 is available for £15 from Acorn Customer Services, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN.**

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**BBC-B** with disc interface, speech, SWRR, £180. Challenger RAM-disc drive £65. Kaga-Taxan colour monitor, £110. Printer, £55 ono. Tel: 061-860 5572.

**Bare** disc drives 40 trk, double sided £50, each. 80trk single sided £30 each. Contact AN Bincham, Wind in the Willows, Northend, Warks CU33 0TW.

**BBC** Electron original games (Barbarian, Shark, Saigon, Sport etc) £4 each. SAE to P Sanderson, 69 Rhodes Avenue, Newbold, Chesterfield, Derbyshire.

**Master 512** with Viglen console unit, twin disc drive, mouse, colour monitor, IBM software, games, books etc. Excellent condition, £850. Tel: 01-844 2181.

**Epson** RX80 printer in excellent condition for sale, £80, no offers. Tel: (0634) 409270.

**Master 128** and Viglen cartridge system. £400 ono. Tel: 01-863 1200 eves.

**Archimedes 310** colour as new, with software and reference manuals, twin discs, £1100 ono. Tel: (0705) 388953.

**Forth** complete development system (Rockwell). Two 3.5in. drives. Editor, Beeb Forthwriter package. Documentation. Ideal starter/professional. £180. Details (0903) 815936.

**BBC B,** Watford DDFS 1.52, View 2.1, ZIF, 40/80t drives, monitor, various ROMs and disc programs, £420. KAGA910 printer, £120. Tel: Oxford 51222.

**Wanted** Hiword wordprocessor ROM. Tel: (0983) 864857.

**Quest** mouse and paint (many extra fonts) £55, Master-compatible, Music 500 plus audio lead, £30, Electron, £35. Tel: (051) 546 1543.

**BBC B** issue 4, manual, joysticks, TV/ monitor, £150 ono. Tel: (0483) 69872, eves.

**Electron** 64k with Master RAM board, £60. Also 32k Electron, £25. Tel: Jack (0279) 32809.

**BBC B** OS 1.2 joysticks, manuals (advanced), plus some games, good condition. £165 ono. Tel: (0784) 51882.

**Electron** ROMbox plus Slogger joystick interface, Quickshot II turbo joystick, many games, books, manuals, leads etc. £100. Tel: (0775) 5466.

**Electron,** Plus 1 DFS/ADFS disc interface (supports Winchesters + floppies), Datacorder progs, joysticks, 16k SWR. £150 ono Tel: Paul (0273) 604248.

**Watford** Electronics Beeb speech synthesiser, £20 (includes ROM), Quest mouse +, Quest paint. £45. Games £2.50 each. Tel: (0224) 317325.

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**Wanted** BBC B with disc drive etc. Tel: (0257) 421839 after 4pm.

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**Master 128,** colour monitor, 5.25in drive, modem, joysticks, mouse, 250+. Games, speech rec unit. As new. Any offers. Tel: (0234) 54804.

**Master** system for sale. Too much to fit in one ad. For details phone Chris on (0243) 671098.

**BBC B** issue 7, Opus drive + DDOS, Acorn recorder, Marconi Trackerball, games, discs, tapes and books. £400 ono. Tel: Chris (0464) 20432.

**BBC B** WP-system. DFS, View, Spellcheck, sidewise ROM/RAM, FX80 printer, dual 40T drives, Philips monitor, manuals, £650. Tel: (0342) 714630.

**BBC B,** DFS, 40T drive, Microvitec colour monitor, speech, data recorder, *Micro Users* (five vols), £300. Tel: Tony 01-997 8487.

**Compact** Viglen Data Duck £10, Mertec companion £25, AMX mouse £20, with Superart £30. Wanted mono/col monitor. Tel: (0222) 811076.

**Electron,** Plus One, View (all boxed with manuals), data recorder, joystick, advanced user guide, mags. Bargain £90. Tel: (0384) 634747.

**Wanted** Master 128 or 512 preferably with double sided or dual 40/80 track drive. Tel: (0228) 70464 eves.

**Master 128,** modem, dual 40/80T drives, monitor, books, torch Z80 board, software, cassette recorder, £950 ono. Tel: Glynn (0274) 661092 (eves.)

**Electron** 64k, Plus 1, plus 3, colour monitor, ROMs, software, books, mouse, £350. Tel: (0695) 632563 (eves.)

**Electron,** Plus 1, Cumana disc interface, cassette recorder, manuals, games/ adventure tapes, dust cover, excellent condition, £100. Tel: (0865) 391727.

**Mini Office II** ROM-board. Student needs dosh urgently! Unwanted prize £35 ono. Tel: Duncan (0522) 85 652.

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**Archimedes** A310 colour, ANSI 'C', twin editor, Zarch, Archimedes reference manuals, ARM book, discs, boxed as new, £900. Tel: 061-434 3488, flat 5.

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**Electron** 64k with turbo master RAM board, £60, also 32k Electron, £25. Adler desktop calculator, £10. Tel: (0279) 32809.

**32016** 10MHz second processor, Panos V1.4 and all languages, £500 ono. 6502 second processor, £50. Tel: 031-667 4180 eves.

**Master** turbo, Viglen keyboard/case, twin 40/80 DS/DD drives, Viewstore, Pagemaker, mouse, cartridges, NLQ ROM, software, manuals, £650. Tel: (0895) 449726.

**BBC B+** 1770 DFS, 2 40/80T, disc drives, Cub 452, monitor, Wordwise, KP10 printer, trackerball, Quickshot, Voltmace joysticks, manuals. Tel: (0753) 86573.

**BBC B** issue 7 Cub 452 colour monitor, dual drives, modem, teletext adaptor. Wordwise+, Spellmaster, £400. Tel: (0375) 643763.

**BBC B** colour monitor, Aries B12/B32, twin disc drive, Wordwise Plus, Wordaid, other software plus discs included, £500. Tel: 091-372-1225 (eves.)

**Wanted** Acornsoft or Beebug 'C'. Will buy or swop. For sale, Computer Concepts Speech system with TMS 5220, £25. Tel: (0222) 811076.

**Wanted** Graphics software *Tesselator* including manual, publisher Addison Wesley. Please write IB Heide, 24 Bueager, 2950 Vedbak, Denmark.

**Electron,** Plus-One, printer, cassette player, joysticks, View, Viewsheet ROMs, educational software. Hardly used, £220. Tel: (0625) 28831.

**Touchpad** complete with original software, exchange for anything useful for BBC B. Specially want 5.25in disc drive. Tel: (0900) 3939.

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AS SEEN ON TV

# ACORN ABUSER'S

## DIARY

## Hip-hip hooray!

We couldn't resist this one – a chance to abuse obergruppenfuhrer Tony Quinn, courtesy of Mike Williams of *Debug* magazine (the greenhouse dweller of the BBC world after sending this in from *The Herald* in St Albans. Sensitivity prevents any mention of. . .).

The cutting says it all, although strangely enough this Tony Quinn actually looks like a different Mike Williams.

And while we're on the mystic side of things, how's about some Buddhist monks who came over here, courtesy of Fuji, to perform the opening blessing ceremony at media sellers Abraxas. The peculiar pair are Clarke (far right) and Crawford (seated) of Abraxas.

## Yup-yup!

The inclusion of Mewsoft's *Faxfile* personal organiser software in our BBC Top 100



**Slipping a disc Yuppie-style**

caused raised eyebrows in the non-yuppie sector of Abuser.

Big Ed Bell was for it (he's a Techie), as were the Swells on the staff. Ex-Dinkie Quinn was agin it, but the combined persuasiveness of Teachie Futcher and Frump Atherton swung it.

So, for all those Mewsofting readers, and those with Resource's organiser inserts, we just had to print the picture above. It's a 3.5in disc holder with the obligatory six holes from Rexel. It looks set to become a staple for the personally-organised.

## Erupting awards

The Abuser has its own Tony award scheme, but the BBC's *Volcanoes* video disc has gone out and won a Nebbie! Why it's called that is beyond us, but it was given in Nebraska.

## Time to say Podd off

Tales reach us of soon-not-to-be Acorn training centre manager Podd Howitzer and his exploits with Mad Alex (who is himself still not yet fully house-trained) in Germany.

The much-loved Podd left his Arc demo discs at Heathrow on the way to a session with Forces teachers, but luckily there were lots of pirated copies on hand to help out!

'Every year he does something daft,' was the comment from a pair of the extremely well-entertained attendees.

Meanwhile Alex the Poodle was, amazingly, attempting to fit a second astounding disc drive to the blindingly fast Arc. His level of success was on a par with his amazing skills using the bostin' coffee machine – he had a lot of fantastic problems. Luckily, the audience was able to help out again.

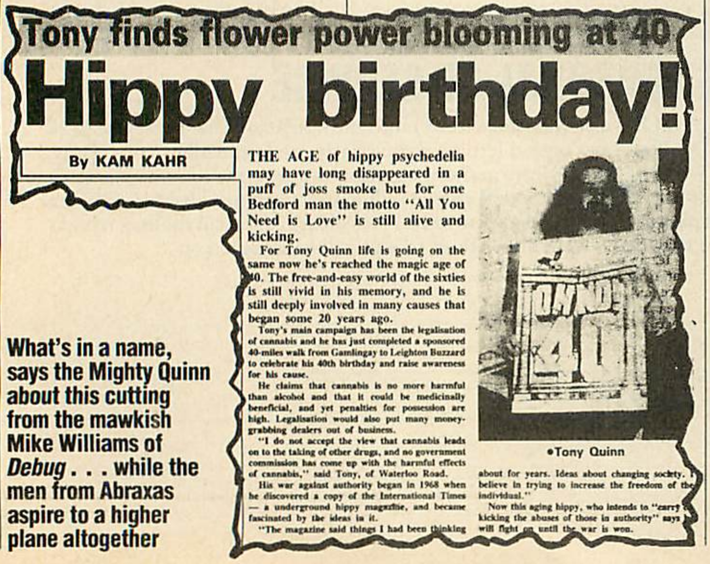
Old Podd is off to Kelator. He will be much missed in Newmarket Rd. Meanwhile Alex is still missing one of his splendid designer suits.

## Reversed-out

This beautiful description of ESM's *Screenprint* comes from the firm's PR agency: 'Users need only press two keys on the printer to obtain an instant print-out on the screen in colour.' Is this a digitiser? Orson says the public should be told.

## On the Street

If you're ever in *Coronation Street*, don't forget to pick up your copy of *Acorn User*. It's on the racks in The Cabin above *Woman's Own*.



Tony finds flower power blooming at 40

Hippy birthday!

By KAM KAHR

THE AGE of hippy psychedelia may have long disappeared in a puff of joss smoke but for one Bedford man the motto "All You Need is Love" is still alive and kicking.

For Tony Quinn life is going on the same now he's reached the magic age of 40. The free-and-easy world of the sixties is still vivid in his memory, and he is still deeply involved in many causes that began some 20 years ago.

Tony's main campaign has been the legalisation of cannabis and he has just completed a sponsored 40-miles walk from Gamlingay to Leighton Buzzard to celebrate his 40th birthday and raise awareness for his cause.

He claims that cannabis is no more harmful than alcohol and that it could be medicinally beneficial, and yet penalties for possession are high. Legalisation would also put many money-grabbing dealers out of business.

"I do not accept the view that cannabis leads on to the taking of other drugs, and no government commission has come up with the harmful effects of cannabis," said Tony, of Waterloo Road.

His war against authority began in 1968 when he discovered a copy of the International Times — a underground hippy magazine, and became fascinated by the ideas in it.

"The magazine said things I had been thinking about for years. Ideas about changing society. I believe in trying to increase the freedom of the individual."

Now this aging hippy, who intends to "carry on kicking the abuses of those in authority" says he will fight on until the war is won.

•Tony Quinn

**What's in a name, says the Mighty Quinn about this cutting from the mawkish Mike Williams of *Debug* . . . while the men from Abraxas aspire to a higher plane altogether**



MINERVA SOFTWARE FOR THE

Archimedes

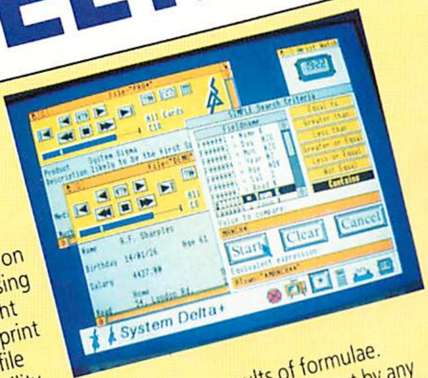
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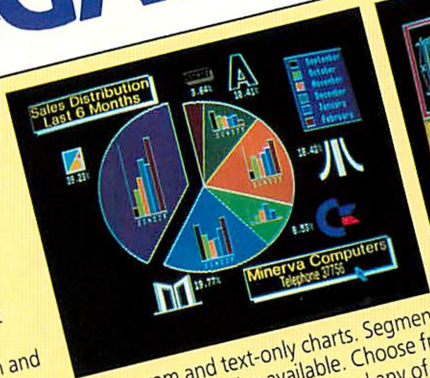
# SYSTEM DELTA

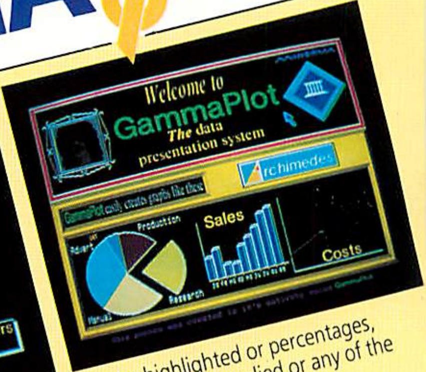
System Delta is the most comprehensive database available yet. It's so simple to operate that it has already become the standard in educational fields. It is very professional and pleasing in its presentation, making full use of the genuine Archimedes WIMP environment. It can handle vast amounts of data in the office, school or home, with its capacity of 2.14 billion records and 16 million fields. Its multiple 'key fields' allow any record to be found in 1 sec. even in a file of 20,000 records.

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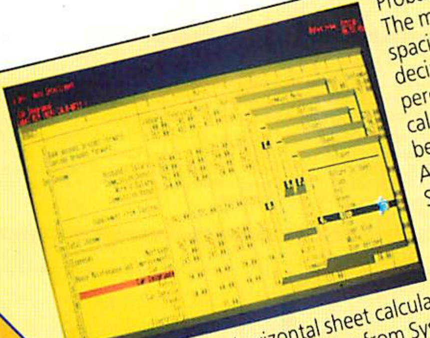




Seeing is believing! GammaPlot is an extensive chart/graph plotting program with a full art package included. It allows even a novice to produce stunning charts and drawings on one screen. Several charts may be placed on one sheet, in any position with text or drawings to make the data easily understood.

GammaPlot supports six main graph and chart types of line, scatter, pie, histogram, 3D histogram and text-only charts. Segments may be highlighted or percentages, values and labels switched on. Statistics are also available. Choose from the text styles supplied or any of the native Archimedes 'pretty fonts' or even define your own, and any of these can be enlarged or reduced. Various shapes, patterns and borders are supplied with a full 256 colour range. Full zoom facility. Various pen types are provided to draw pictures or add signatures. Import digitised pictures or company logos. Print facilities include colour output. Data entry is via the keyboard or any Delta, Gamma or Sigma file.

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